PFU Systems™

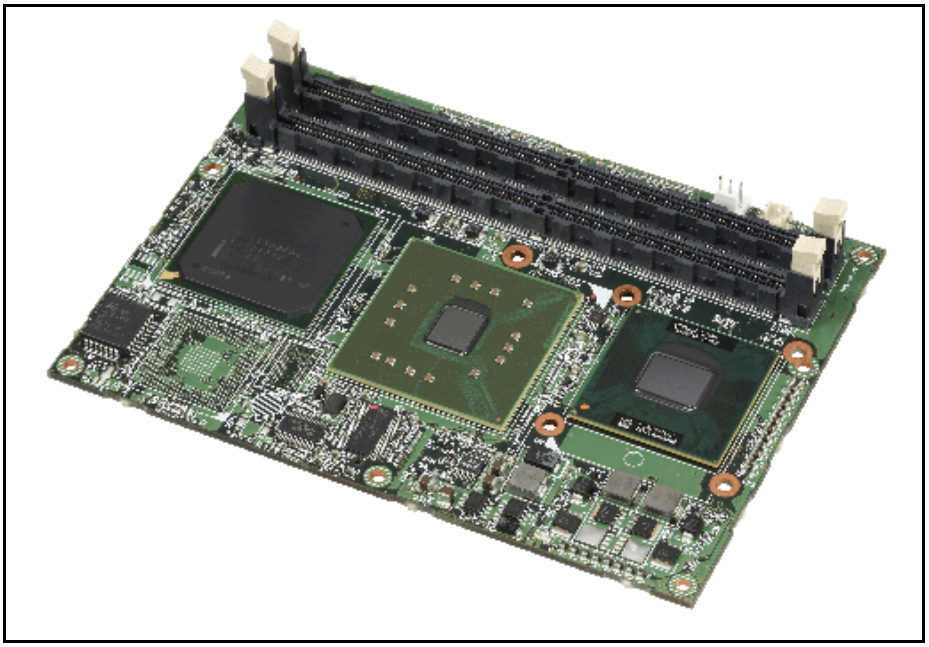
a Fujitsu company

Plug-N-Run™ E1 Computer-On-Module Series

COM Express

COM Express Compliant

Plug-N-Run E1
BIOS Manual



Version 1.1

March 2009 **PS-E1PR-BM-011**

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Introduction

Thank you for basing your system on our COM Express compliant Plug-N-Run E1 Computer-On-Module, also known as System-On-Module. We are confident that it will help you in getting your product to market quickly while reducing overall development cost.

This document, the "Plug-N-Run E1 BIOS Manual", describes the BIOS that configures and manages the Plug-N-Run E1's hardware environment. Specifically, it describes the layout and usage of the BIOS Setup Program screens.

A thorough understanding of this manual will be of particular help in the following situations:

- When testing different Plug-N-Run E1 setups using the Development Board
- When developing Plug-N-Run E1 based embedded systems

We hope you find this manual to be of use, and look forward to any comments or suggestions you may have.

PFU Systems, Inc.
March 2009

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Related Documentation

Please consult the following documents for additional information on the Plug-N-Run E1.

- Plug-N-Run E1 Hardware Reference Manual (PS-E1PR-RM-xxx)
- Plug-N-Run E1 Design Guide
  - Hardware Design Considerations * (PS-E1PR-DGHW-xxx)
  - Thermal Design Considerations * (PS-E1PR-DGTH-xxx)
- Plug-N-Run G5 Development Board User Manual (PS-5PR-DEV-UM-xxx)
- Plug-N-Run G5 Development Board Design Guide * (PS-5PR-DEV-DG-xxx)

* Due to the confidential nature of the material in this document a Non Disclosure Agreement between the customer and PFU Systems must be executed. Please refer to your sales support person for details.

The latest versions of these documents are available from your PFU sales representative or from the PFU Systems' web site at www.pfusystems.com.

In addition, the user may wish to reference the following publications.

- The Programmer's PC Source Book, Thom Hogan
- The Phoenix Technical Reference Series - System BIOS for IBM-PC/XT/AT Computers and Compatibles, Addison Wesley
- System BIOS for IBM PCs, Compatibles, and EISA Computer Second Edition, Phoenix Technologies, Addison Wesley

This list is provided purely for reference purposes.
Any information regarding component functionality does not necessarily reflect the actual features implemented in the Plug-N-Run E1.

Applicable Plug-N-Run E1 Models

This manual is specifically for use with the following Plug-N-Run E1 models:

- 2.16GHz Plug-N-Run E1 Extended module (PSE1PR216X2)
- 1.50GHz Plug-N-Run E1 Extended module (PSE1PR150X2)

Plug-N-Run E1 Software Utilities and Drivers

PFU Systems provides the following software utilities for use with the Plug-N-Run E1.

Plug-N-Run E1 BIOS Tool Kit zip file (PSE1BTKxxx.zip)

- System & Video BIOS Binary Files
- BIOS Modification Utilities (BCU.BAT, etc.)
- Flash-ROM Update Utility (PHLASH16.EXE)
- BIOS Configuration User Manual (MANUAL.PDF)
- Read Me File

Plug-N-Run E1 Drivers Support Package zip file (PSE1DSPxxx.zip)

- Windows® 2000/XP Display Driver
- Windows® 2000/XP Network Driver
- Windows® 2000/XP Audio Driver
- Windows® 2000/XP AHCI Driver
- Windows® 2000/XP Intel® Chipset Driver

- The User Guide in the Plug-N-Run E1 BIOS Tool Kit zip file describes the BIOS Modification Utilities (BIOS disk and BIOS Rescue disk)
- Appendix A *Cautions & Limitations* describes how to install the Windows® 2000/XP drivers

Layout Of This Manual

Chapter 1 BIOS Overview

Presents a brief overview of the BIOS firmware used for the PFU Systems Plug-N-Run E1.

Chapter 2 Using BIOS Setup

Presents the BIOS Setup Program.

Chapter 3 BIOS Setup Menus

Explains the various menus and configuration options in the BIOS Setup Program.

Chapter 4 BIOS Functions

Explains the details of a variety of BIOS functions.

Symbols Used In This Manual

The following symbols are used in this manual:

Explains supplementary details.
Read as necessary.

Draws attention to a precaution that should be observed.
Alternately warns of an unacceptable or dangerous practice.
Should always be read!

References related information in a different area of this manual, or in another manual.

Contents

Introduction i
Related Documentation ii
Applicable Plug-N-Run E1 Models ii
Plug-N-Run E1 Software Utilities and Drivers iii
Layout Of This Manual iv
Symbols Used In This Manual iv
Contents v
List of Figures ix
List of Tables xi

Chapter 1 BIOS Overview 1

BIOS Features 1
Start-up Process Flow 3
BIOS Messages 4
Beep & Diagnostic Codes 6
BIOS Image File 10
BIOS Image File for the Plug-N-Run E1 10
Memory Map 11
I/O Map 12
DMA Channels 13
System Interrupts 13

Chapter 2 Using BIOS Setup 15

What is BIOS Setup? 15
When should BIOS Setup be Run? 15
How do You Use the BIOS Setup Program? 15
Starting BIOS Setup 16
Operating BIOS Setup 16
BIOS Setup Usable Keys 16
Changed BIOS Setup Settings 17
Exiting the BIOS Setup Program 18

Chapter 3 BIOS Setup Menus 19

BIOS Setup Program Menus 19
Main Menu 20
Main Menu Sub-Menus 21
IDE Channel Detailed Settings 21
ATA Configuration Settings 23
Advanced Menu 25

Advanced Menu Sub-Menus 27
Processor Configuration Settings 27
PCI Configuration Settings 28
PCI Device, Slot Settings 29
Advanced Chipset Control Settings 30
Internal Device Configuration Settings 31
Event Logging Settings 33
Security Menu 35
Power Menu 36
Power Menu Sub-Menus 38
Advanced CPU Configuration Settings 38
Boot Menu 40
Boot Menu Sub-Menus 41
Boot Device Priority 41
Exit Menu 43

Chapter 4 BIOS Functions 45

Booting from any Device 45
Power Management Functions 45
Sleep States 45
Hibernation 46
Wake Up 46
CPU Power Saving Functions 46
Thermal Monitoring Functions 46
Event Log Function 47
How the Event Log Function Works 47
Event Log Area 49
Event Log BIOS Runtime Routines 50
Password Function 52
Setting a password 52
Changing the password 52
Deleting the password 53
Accessing BIOS Setup after a password is set 53
Entering the wrong password 53
Serial ATA Interface 53
SATA Features 53
ATA Mode 54
ATA Mode and Channel Assignments 55
Watchdog Timer 56
Purpose of the Watchdog Timer 56
Using the Watchdog Timer 57
Reloading the Counter 57

Appendix A Cautions & Limitations 59

Outline 59
Installing Drivers 59

Notes on Using Peripheral devices Made by Other Companies....59

Appendix B Use of Legacy Devices....60

Which Legacy Devices? 60
BIOS Type....60
Super I/O 61
BIOS Setup Changes (Due to the SCH5017)....61
Main Menu....61
Advanced Menu....62
I/O Device Configuration 1 Settings 63
Internal Device Configuration Settings 65
Console Redirection Settings 66
BIOS Setup Changes (Due to SIO10N268)....67
Advanced Menu....67
I/O Device Configuration 2 Settings 68
Console Redirection 69
Required Terminal Environment....69
Required Serial Cable 69

INDEX 71

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List of Figures

Figure 1 Loading the BIOS Image File for the Plug-N-Run E1 10
Figure 2 Memory Map 11
Figure 3 I/O Map 12
Figure 4 BIOS Setup Menu 16
Figure 5 Main Menu 20
Figure 6 IDE Channel Detailed Settings Sub-Menu 21
Figure 7 ATA Configuration Settings Sub-Menu 23
Figure 8 Advanced Menu 25
Figure 9 Processor Configuration Settings Sub-Menu 27
Figure 10 PCI Configuration Settings Sub-Menu 28
Figure 11 PCI Device Slot Settings Sub-Menu 29
Figure 12 Advanced Chipset Control Settings Sub-Menu 30
Figure 13 Internal Device Configuration Settings Sub-Menu 31
Figure 14 Event Logging Settings Sub-Menu 33
Figure 15 Security Menu 35
Figure 16 Power Menu 36
Figure 17 Advanced CPU Configuration Settings Sub-Menu 38
Figure 18 Boot Menu 40
Figure 19 Boot Device Priority Settings Sub-Menu 41
Figure 20 Exit Menu 43
Figure 21 Event Log Area & Record Format 49
Figure 22 Hang-up Detection with the Watchdog Timer 56
Figure 23 Main Menu (SCH5017) 61
Figure 24 Advanced Menu (SCH5017) 62
Figure 25 I/O Device Configuration 1 Settings Menu 63
Figure 26 Internal Device Configuration Settings Menu (SCH5017) 65
Figure 27 Console Redirection Settings Menu 66
Figure 28 Advanced Menu (SIO10N268) 67
Figure 29 I/O Device Configuration 2 Settings Menu 68
Figure 30 Serial Cable Wiring Diagram 69

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List of Tables

Table 1 POST Phase BIOS Messages 4
Table 2 Phoenix TrustedCore™ Port 80h Diagnostic Codes & Beep Codes 6
Table 3 DMA Channels 13
Table 4 IRQ Assignment 13
Table 5 List of Event Log Message 48
Table 6 POST Error Status Bitmap 50
Table 7 ATA Mode & Channel Assignments 55
Table 8 Legacy Devices Conditions 60
Table 9 Special Key and Escape Sequence Codes 69

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Chapter 1 BIOS Overview

This chapter gives a brief overview of the BIOS firmware used in with the Plug-N-Run E1.

BIOS Features

Each Plug-N-Run E1 has a copy of Phoenix Technologies' Phoenix TrustedCore™ pre-installed in the onboard Flash-ROM. This BIOS is adapted to provide extensive control over the Plug-N-Run E1 for power management configurations, boot options, event logging and other features that are important for embedded applications.

Currently supported features include:

1 POST (Power On Self Test)

Executed by the BIOS POST (Power On Self Test) routines after power ON or system reset. Diagnostic results are reported by on-screen messages, buzzer codes and signals output to I/O Port 80h.

The BIOS version may differ from model to model, and the level of functionality supported will differ from version to version. The BIOS version number is also shown on the screen at POST time.

2 Power Management

ACPI-ready OSes are able to use this ACPI 2.0 compliant power management interface.

Enhanced Intel SpeedStep® Technology, CPU clock throttling, memory frequency selection and graphics processor display core frequency selection are also supported, allowing CPU performance and power consumption to be optimized. Also supported are selective enable/disable of integrated sub functions, such as the graphics processor unit, LVDS transmitters, serial ports, parallel ports, IDE controllers, USB controller, FDD controller, etc.

Future versions of the BIOS will further add support for memory bandwidth throttling as well to further expand power management capabilities of the Plug-N-Run E1.

3 PnP (Plug and Play)

The PnP BIOS 1.0A specification is supported for Plug and Play functionality.

4 QuietBoot

By using Phoenix QuietBoot, you can suppress the diagnostic information and other messages that are displayed during the POST phase. During this period, graphical illustrations will appear on the screen until the OS is loaded.

5 ROM-BIOS Functions

Two interfaces are supported: the IBM PC/AT compatible ROM-BIOS interface (INT10h – INT1Ah) and the IBM PC/AT compatible Extended ROM-BIOS interface.

6 BIOS Setup

If the <F2> key is pressed immediately after power ON or system reset, the BIOS Setup Program in BIOS ROM is executed. The operating hardware environment settings and the BIOS environment settings can be changed in BIOS Setup.

7 BIOS Modification

You can modify the following BIOS functions in Flash-ROM by using the BIOS Modification Utilities:

- Modifying the Default values in Setup
  When using a dedicated system, a user may find it difficult to change the BIOS Setup values. Using the BCU.BAT utility, the user may store to Flash-ROM new default values along with the BIOS, eliminating the need to access BIOS Setup when making changes such as swapping Plug-N-Run E1 modules.

See the *BIOS Configuration User Manual* for more details

8 MultiBoot

The Plug-N-Run E1 may be booted from any connected bootable device, with the boot priority being determined in BIOS Setup.

See *Booting from any Device* in Chapter 4 *BIOS Functions* and *Boot Menu* / *Boot Menu Sub-Menus* in Chapter 3 *BIOS Setup Menus* for more details of the MultiBoot feature.

9 Password Security

A password may be set to restrict access to BIOS Setup.

10 Event Log

Details of POST errors can be stored in the Flash memory, and then checked via BIOS Setup.

See also *Event Log Function* in Chapter 4 *BIOS Functions*

11 ATAPI Removable Device

The Plug-N-Run E1 can boot from ATAPI Removable devices such as LS-120 Super FDD and IOMEGA Zip Drive.

12 QuickBoot

Faster boot by omitting POST phase for FDD and DRAM, and suppressing PC beeps.

13 Legacy Mode USB Support

Support for USB keyboard and mouse for legacy operating systems and in BIOS setup mode.

14 Serial ATA

In addition to the legacy parallel ATA (hereafter P-ATA) IDE interface, the newer serial ATA (hereafter SATA) IDE interface is also supported.

15 SMBIOS

System Management BIOS (SMBIOS) version 2.3.3 is supported.

16 Super I/O

This BIOS supports the following Super I/O chips:

Primary

- SCH5017 (SMSC)

Secondary

- SIO10N268 (SMSC)

Refer to Appendix B *Use of Legacy Devices* for details of the BIOS functions available to the system when one of the above Super I/O chips is used.

Caution The SCH5017 chip (SMSC) may be used interchangeably in place of the DME1737 chip (SMSC).

Start-up Process Flow

After Power On or System Reset, the BIOS proceeds through the following 4 phases:

1 Initialization

The Plug-N-Run E1 module's internal controllers and other hardware components are initialized according to the BIOS Setup settings. Among the various controllers that may be targeted for initialization are:

- CPU
- DRAM Controller
- Cache memory
- Interrupt (IRQ) Controller
- Interval Timers
- Graphics Controller
- DMA Controller
- Real-Time Clock (RTC)
- Parallel/Serial Ports (*1)
- Expansion Serial Ports (*2)
- Keyboard Controller (*1)
- Floppy Disk Controller (*2)
- PCI-IDE Controller
- LAN Controller
- Sound Controller
- USB Controller
- Serial ATA Controller

***1** Only initialized when a SCH5017 Super I/O chip is used.
Keyboard Controller is only initialized by PS/2 compliant BIOSes.
***2** Only initialized when a SIO10N268 Super I/O chip is used.

2 POST (Power On Self Test)

The various system components are checked.

3 Boot Load

The operating system is loaded.

4 Service Routines

The BIOS also handles OS or application program calls to service routines that use IBM-PC compatible ROM-BIOS functions INT 10h – INT 1Ah.

Caution Avoid powering off or reset when the BIOS is processing POST or initialization. If this occurs, for the next boot the CPU cache will be disabled and the following message will be displayed:

0280: Previous boot incomplete - Default configuration used

Refer to Table 1 as well.

BIOS Messages

After System Reset and Initialization, the BIOS enters the POST (Power On Self Test) phase. POST is a self-diagnostic process in which the system checks itself for problems.

During the POST phase, Phoenix TrustedCore™ displays a variety of the following diagnostic messages on the screen. These include both progress messages and error messages that only appear if a problem is discovered. Table 1 shows the BIOS messages that may occur during the POST phase and their meanings.

Table 1 POST Phase BIOS Messages

BIOS Message	Meaning
0200: Failure Fixed Disk	A problem has been detected with the hard disk
0210: Stuck Key	A problem has been detected with the keyboard operation (Stuck key)
0211: Keyboard error	A problem has been detected with the keyboard connection
0212: Keyboard Controller Failed	A problem has been detected with the keyboard controller
0213: Keyboard locked - Unlock key switch	The keyboard is locked - Release the key switch
0220: Monitor type does not match CMOS - Run SETUP	BIOS settings do not match actual monitor - Fix with BIOS Setup
0230: System RAM Failed at offset: nnnn	A problem has occurred with the System RAM memory
0231: Shadow Ram Failed at offset: nnnn	A problem has occurred with the Shadow RAM memory
0232: Extended RAM Failed at address line: nnnn	A problem has occurred with the Extended RAM memory
0250: System battery is dead - Replace and run SETUP	The backup battery is dead - Replace it and run the BIOS Setup Program again
0251: System CMOS checksum bad - Default configuration used	A problem has been detected with the CMOS RAM data - Default values have been used for some settings.
0260: System timer error	A problem has been detected with the system timer
0270: Real time clock error	A problem has been detected with the RTC
0271: Check date and time settings	Date and time settings have not been done
0280: Previous boot incomplete - Default configuration used	The last boot did not finish normally - Default values have been used for some settings
0281: Memory Size found by POST differed from EISA CMOS	Memory size detected by POST did not match the contents of EISA CMOS
02B0: Diskette drive A error	A problem has been detected with floppy drive A
02B2: Incorrect Drive A type - run SETUP	Floppy drive A needs to be redefined in BIOS Setup
02D0: System cache error - Cache disabled	A problem has been detected with the system cache - Cache is not useable
xxxx Address Conflict	Conflict has been detected between internal & external I/O addresses
Allocation Error for xxxx	An allocation error has occurred in the resource with the device displayed in xxxx
CD ROM Drive	CD ROM drive has been detected
Entering SETUP ...	Starting the BIOS Setup utility
Failing Bits: xxxx	An error has occurred during the memory test at the address displayed in xxxx
Fixed Disk n:	Hard disk number n (0 – 3) has been detected
Invalid System Configuration Data	The system configuration values are not correct
IO device IRQ conflict	Conflict has been detected between I/O IRQs
Keyboard Detected	The keyboard has been detected
Mouse initialized	The mouse has been initialized
nnnnM Extended RAM Passed	Extended RAM testing has finished
nnnn Cache SRAM Passed	Cache SRAM testing has finished
nnnn KB Shadow RAM Passed	Shadow RAM testing has finished

Table 1 POST Phase BIOS Messages

BIOS Message	Meaning
nnnn KB System RAM Passed	System RAM testing has finished
Operating system not found	A device containing a bootable OS cannot be found - Check that the drive setup is correct
Parity Check 1 nnnn	A parity error has occurred in the system bus nnnn
Parity Check 2 nnnn	A parity error has occurred in the I/O bus nnnn
Press <F1> to resume, <F2> to Setup, <F3> for previous	Displayed at the end of the POST phase if an error has occurred - Press <F1> to load the OS, <F2> to activate BIOS Setup, <F3> to activate Setup Utility of the extended BIOS
Press <F1> to resume, <F2> to Setup	Displayed at the end of the POST phase if an error has occurred - Press <F1> to load the OS, <F2> to activate BIOS Setup
Press <F1> to resume, <F3> for previous	Displayed at the end of the POST phase if an error has occurred - Press <F1> to load the OS, <F3> to activate Setup Utility of the extended BIOS
Press <F1> to resume	Press <F1> to load the OS
Press <F2> to enter Setup	Press <F2> to activate the BIOS Setup
System BIOS shadowed	The system BIOS is being shadowed
Video BIOS shadowed	The video BIOS is being shadowed
PC re-booted due to Watch Dog timeout.	The system has been forced to reset or re-boot by the Watchdog Timer timing out.

Beep & Diagnostic Codes

As the BIOS proceeds with the POST phase, as well as displaying messages to the screen, it also outputs a variety of diagnostic codes to I/O port 80h. If a speaker is connected, the port 80h value can be understood from the number of beeps. The beep codes correspond to the port 80h diagnostic codes described previously, expressed as (base4 + 1) numbers. For example, in the case of an interrupt test error (58h) the following beeps are emitted:

Beep-beep, pause, Beep-beep, pause, Beep-beep-beep, pause, Beep

1. Subtract one from each number of beeps:
   2-2-3-1 → 1-1-2-0
2. Convert each number to binary:
   1-1-2-0 → 01-01-10-00
3. Concatenate the 1st & 2nd numbers, and the 3rd & 4th:
   01-01-10-00 → 0101-1000
4. Convert the numbers to hexadecimal:
   0101-1000 → 5-8

Giving the 58h code that we were looking for.

Table 2 lists these codes that may output during the POST phase and their meanings.

Refer

- When using a "Plug-N-Run G5 Development Board" (PS5PRDEVBDR), the diagnostic code will be displayed by a dual 7-segment display with LEDL as the least significant digit and LEDH as the most significant digit.

Table 2 Phoenix TrustedCore™ Port 80h Diagnostic Codes & Beep Codes

Diagnostic Code	Beep Code	Meaning
02h		Verify processor mode
03h		Disable Non-Maskable Interrupt (NMI)
04h		Get CPU type
06h		Initialize system hardware
07h		Disable shadow and execute code from the ROM.
08h		Initialize chipset with initial POST values
09h		Set IN POST flag
0Ah		Initialize CPU registers
0Bh		Enable CPU cache
0Ch		Initialize caches to initial POST values
0Eh		Initialize I/O components
0Fh		Initialize the local bus IDE
10h		Initialize Power Management
11h		Load alternate registers with initial POST values
12h		Restore CPU control word during warm boot
13h		Initialize PCI Bus Mastering devices
14h		Initialize keyboard controller
16h	**1-2-2-3**	BIOS ROM checksum
17h		Initialize cache before memory autosize
18h		8254 timer initialization
1Ah		8237 DMA controller initialization
1Ch		Reset Programmable Interrupt Controller
20h	**1- 3- 1- 1**	Test DRAM refresh
22h	**1- 3- 1- 3**	Test 8742 Keyboard Controller
24h		Set ES segment register to 4 GB

Table 2 Phoenix TrustedCore™ Port 80h Diagnostic Codes & Beep Codes

Diagnostic Code	Beep Code	Meaning
28h	**1- 3- 3- 1**	Autosize DRAM[*1]
29h		Initialize POST Memory Manager
2Ah		Clear 512 KB base RAM
2Ch	**1- 3- 4- 1**	RAM failure on address line xxxx
2Eh	**1- 3- 4- 3**	RAM failure on data bits xxxx of low byte of memory bus
2Fh		Enable cache before system BIOS shadow
32h		Calculate CPU speed
33h		Initialize POST Dispatch Manager
34h		Test CMOS RAM and RTC
36h		Initialize shut down victor for warm start
38h		Shadow system BIOS ROM
3Ah		Autosize cache
3Ch		Advanced configuration of chipset registers
3Dh		Load alternate registers with CMOS values
41h		Initialize extended memory for RomPilot
42h		Initialize interrupt vectors
45h		POST device initialization
46h	**2- 1- 2- 3**	Check ROM copyright notice
47h		Initialize I2O support
48h		Check video configuration against CMOS
49h		Initialize PCI bus and devices
4Ah		Initialize all video adapters in system
4Bh		QuietBoot start
4Ch		Shadow video BIOS ROM
4Eh		Display BIOS copyright notice
4Fh		Initialize MultiBoot
50h		Display CPU type and speed
51h		Initialize EISA board
52h		Test keyboard
54h		Set key click if enabled
55h		Enable USB devices
58h	**2- 2- 3- 1**	Test for unexpected interrupts
59h		Initialize POST display service
5Ah		Display prompt "Press F2 to enter SETUP"
5Bh		Disable CPU cache
5Ch		Test RAM between 512 and 640 KB
60h		Test extended memory
62h		Test extended memory address lines
64h		Jump to UserPatch1
66h		Configure advanced cache registers
67h		Initialize Multi Processor APIC
68h		Enable external and CPU caches
69h		Setup System Management Mode (SMM) area
6Ah		Display external L2 cache size
6Bh		Load custom defaults
6Ch		Display shadow-area message
6Eh		Display possible high address for UMB recovery
70h		Display error messages
72h		Check for configuration errors
76h		Check for keyboard errors

Table 2 Phoenix TrustedCore™ Port 80h Diagnostic Codes & Beep Codes

Diagnostic Code	Beep Code	Meaning
7Ch		Set up hardware interrupt vectors
7Dh		Initialize Intelligent System Monitoring
7Eh		Initialize coprocessor if present
80h		Disable onboard Super I/O ports and IRQs
81h		Late POST device initialization
82h		Detect and install external RS232 ports
83h		Configure non-MCD IDE controllers
84h		Detect and install external parallel ports
85h		Checking for PnP ISA devices
86h		Re-initialize onboard I/O ports
87h		Configure Motherboard Configurable Devices
88h		Initialize BIOS Data Area
89h		Enable Non-Maskable Interrupts (NMIs)
8Ah		Initialize Extended BIOS Data Area
8Bh		Test and initialize PS/2 mouse
8Ch		Initialize floppy controller
8Fh		Determine number of ATA drives
90h		Initialize hard-disk controllers
91h		Initialize local-bus hard-disk controllers
92h		Jump to UserPatch2
93h		Build MPTABLE for multi-processor boards
95h		Install CD ROM for boot
96h		Clear huge ES segment register
97h		Fixup Multi Processor table
98h	**1- 2**	Search for option ROMs. One long, two short beeps on checksum failure
99h		Check for SMART Drive
9Ch		Set up Power Management
9Dh		Initialize security engine
9Eh		Enable hardware interrupts
9Fh		Determine number of ATA and SCSI drives
A0h		Test Real Time Clock interrupt
A2h		Check key lock
A4h		Initialize Typematic rate
A8h		Erase F2 prompt
AAh		Scan for F2 key stroke
ACh		Enter SETUP
AEh		Clear Boot flag
B0h		Check for errors
B1h		Inform RomPilot about the end of POST.
B2h		POST done - prepare to boot operating system
B4h	**1**	One short beep before boot
B5h		Terminate QuietBoot
B6h		Check password
B7h		Initialize ACPI-BIOS
B9h		Clear Screen
BAh		Initialize SMBIOS
BCh		Clear parity checkers
BDh		Display MultiBoot menu
BEh		Clear screen
BFh		Check virus and backup reminders

Table 2 Phoenix TrustedCore™ Port 80h Diagnostic Codes & Beep Codes

Diagnostic Code	Beep Code	Meaning
C0h		Try to boot with INT 19
C1h		Initialize POST Error Manager (PEM)
C2h		Initialize error logging
C3h		Initialize error display function
C4h		Initialize system error handler
C5h		PnP dual CMOS
C6h		Initialize note dock
C7h		Initialize note dock rate
C8h		Force check
C9h		Extended checksum
CBh		Redirect Int 13h to Memory Technologies Devices such as ROM, RAM, PCMCIA, and serial disk
CCh		Redirect Int 10h to enable remote serial video
CDh		Redirect Int 15h to enable remote keyboard
CEh		Initialize digitizer and display message
D2h		Unknown interrupt
E0h	**1- 3- 3- 1**	Check memory mounting

***1** When this diagnostic/beep code is output, error details code is output via Port 80h.

BIOS Image File

BIOS Image File for the Plug-N-Run E1

During BIOS initialization the System BIOS is mapped to the 000E0000h - 000FFFFFh region, while the PXE BIOS are mapped to the region starting at 000C0000h.

Figure 1 shows the BIOS image file for the Plug-N-Run E1.

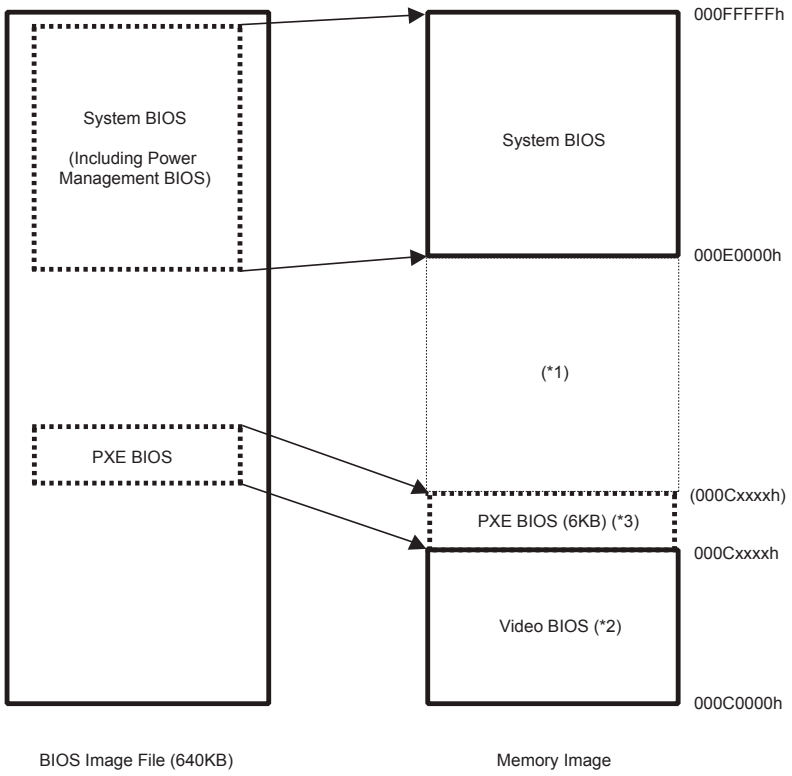


Figure 1 Loading the BIOS Image File for the Plug-N-Run E1

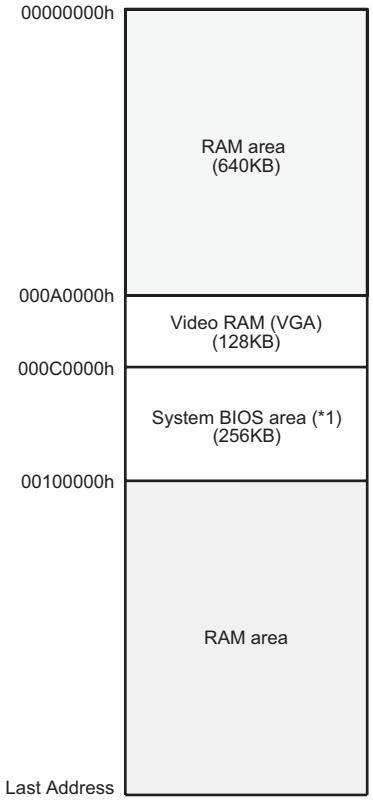
***1** This region can be used to access memory on PCI Slot devices. Extension ROM-BIOS may also use this region. After the System has booted, segments not being used to access memory may be used as a UMB/EMM page frame.

***2** When the Video BIOS is added, it is mapped to this region.

***3** The PXE BIOS is only mapped if both the "LAN Controller" and "PXE OPROM" options are "Enabled" in the BIOS Setup Internal Device Configuration menu (which is a sub-menu of the Advanced menu).

Memory Map

The Plug-N-Run E1 memory map is shown in Figure 2.



***1** It depends on the BIOS features.

Figure 2 Memory Map

Note

- The actual top address will vary according to the amount of memory installed.
  - 256MB: 0FFFFFFFh
  - 512MB: 1FFFFFFFh
  - 1GB: 3FFFFFFFh
  - 2GB: 7FFFFFFFh
- A custom BIOS may have a different memory mapping.
- The system allocates memory to internal and external PCI devices from the unused areas.

I/O Map

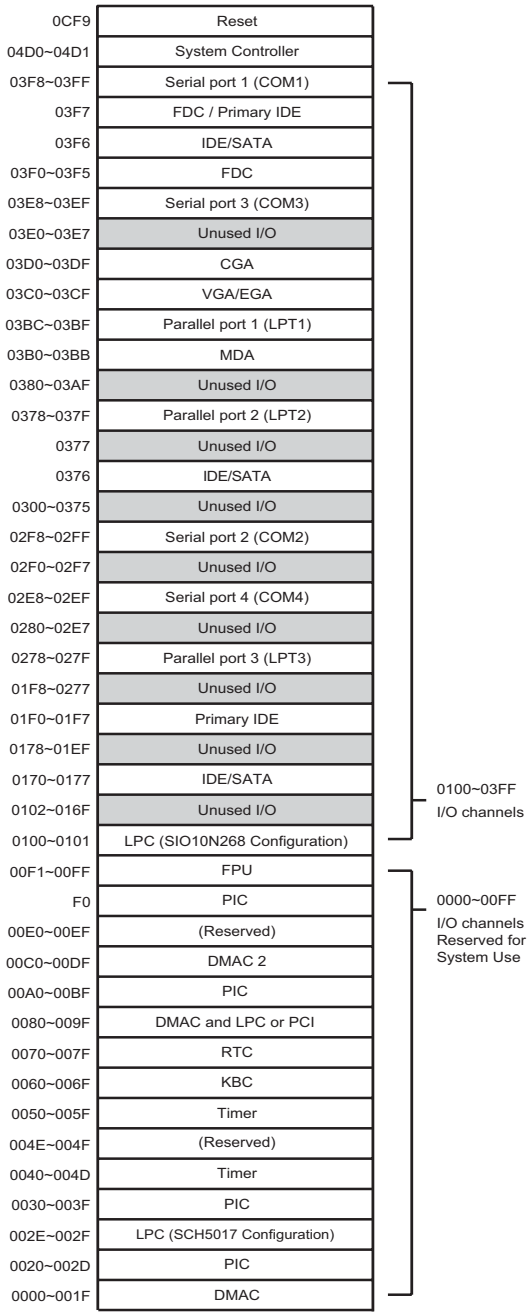


Figure 3 I/O Map

Note

- The area from 0000h – 0100h is reserved for System use and is not available to the user.
- The system allocates memory to internal and external PCI devices from the unused areas.

DMA Channels

Table 3 shows the assignment of the DMA Channels

Table 3 DMA Channels

Internal Controller	Channel	Use	Note
DMA1	0	Unused	
	1		Channels 1 – 3 used by Parallel and Floppy devices.
	2	FDC	
	3		
DMA2	4	(Cascade of DMA1)	
	5	Unused	
	6	Unused	
	7	Unused	

Note

- Channels 0 – 3 are reserved for 8-bit DMA use
- Channels 4 – 7 are reserved for 16-bit DMA use
- Channels 1 – 3 are not used if a SCH5017 Super I/O chip is not mounted.

System Interrupts

Table 4 shows the assignment of the IRQ Interrupts

Table 4 IRQ Assignment

IRQ #	Interrupt Origin	Note
IRQ 0	Interval Timer	
IRQ 1	Keyboard	
IRQ 2	(Cascade)	
IRQ 3		Interrupts 3 – 7 used by Parallel, Serial, and Floppy devices.
IRQ 4		
IRQ 5		
IRQ 6	Floppy Disk	
IRQ 7		
IRQ 8	RTC	
IRQ 9		
IRQ 10		
IRQ 11		
IRQ 12	Mouse	
IRQ 13	FPU (*1)	
IRQ 14	Hard Disk (IDE)	
IRQ 15		

***1** Floating point Unit

Note

- IRQ1, IRQ3 – IRQ7, IRQ12 are not used if a SCH5017 or SIO10N268 Super I/O chip is not mounted.

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Chapter 2 Using BIOS Setup

This chapter outlines usage of the BIOS Setup Program.

What is BIOS Setup?

BIOS Setup is a program that enables you to reconfigure your hardware environment and BIOS operation settings. The Plug-N-Run E1's default BIOS settings have been chosen for the purpose of developing Plug-N-Run E1 target device embedded systems, which means that often there will be no need to use the BIOS Setup Program to alter these settings.

Refer See the *BIOS Configuration User Manual* for details on other ways to change the BIOS

When should BIOS Setup be Run?

The BIOS Setup Program is likely to be run in a variety of situations, for example:

- When changing the boot device priority order
- When the POST displays a BIOS Setup related error message

Note Values set by the BIOS Setup Program are stored in the Plug-N-Run E1's onboard CMOS RAM. To maintain its contents when the Plug-N-Run E1 is turned off, this CMOS RAM requires an external backup battery, or some other power source.

How do You Use the BIOS Setup Program?

The BIOS Setup Program may be started, operated and exited as follows:

Starting BIOS Setup

The BIOS Setup Program may be launched during the POST phase by pressing the <F2> key while the message "Press <F2> to enter SETUP" or "Press F2 for System Utilities." is displayed in the lower left of the screen.

After the BIOS Setup Program starts, the Main Setup menu will be displayed:

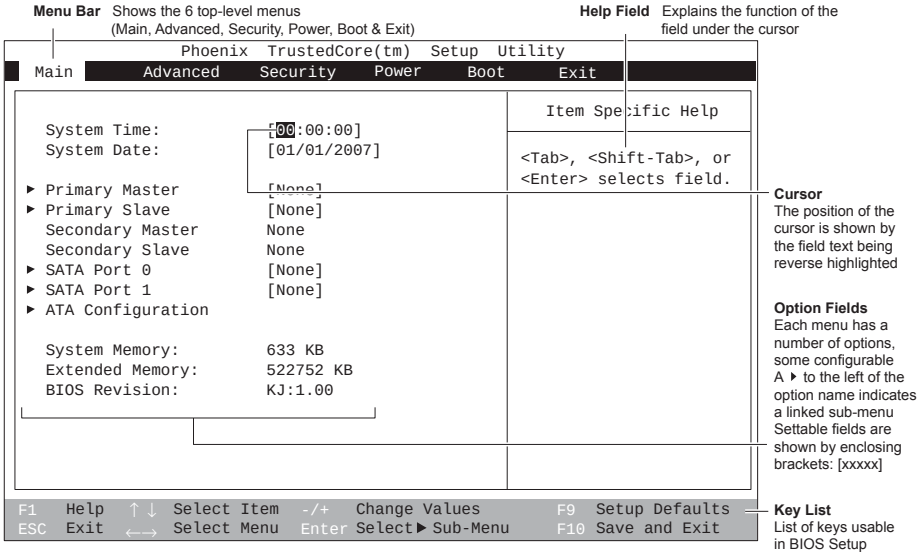
Menu Bar Shows the 6 top-level menus (Main, Advanced, Security, Power, Boot & Exit)
Help Field Explains the function of the field under the cursor
Phoenix TrustedCore(tm) Setup Utility
Main Advanced Security Power Boot Exit
Item Specific Help
System Time: [00:00:00]
System Date: [01/01/2007]
<Tab>, <Shift-Tab>, or <Enter> selects field.
▶ Primary Master [None]
▶ Primary Slave [None]
Secondary Master None
Secondary Slave None
▶ SATA Port 0 [None]
▶ SATA Port 1 [None]
▶ ATA Configuration
System Memory: 633 KB
Extended Memory: 522752 KB
BIOS Revision: KJ:1.00
F1 Help ↑ ↓ Select Item -/+ Change Values F9 Setup Defaults
ESC Exit ←→ Select Menu Enter Select ▶ Sub-Menu F10 Save and Exit
Cursor
The position of the cursor is shown by the field text being reverse highlighted
Option Fields
Each menu has a number of options, some configurable
A ▶ to the left of the option name indicates a linked sub-menu
Settable fields are shown by enclosing brackets: [xxxxx]
Key List
List of keys usable in BIOS Setup

Figure 4 BIOS Setup Menu

Operating BIOS Setup

BIOS Setup has six top level menus (Main, Advanced, Security, Power, Boot and Exit), each of which contains a number of configurable fields. Some of the fields have a ▶ mark next to them, indicating a sub-menu is associated with that field. Sub-menus allow further settings.

Refer

See Chapter 3 *BIOS Setup Menus* for details of the individual menus

BIOS Setup Usable Keys

The BIOS Setup Program displays a list of usable keys at the bottom of the screen:

F1 (Alt+H)	Calls the BIOS Setup Program's on-line Help function. In Help, <PgDn> displays the next page, <PgUp> the previous page.
Esc	If the current menu is a sub-menu display jumps to the parent menu. If the current menu is a parent menu display jumps to the Exit menu.
← →	Used to cycle the screen through the top level (parent) menus.
↑↓	Used to move the cursor between fields within a menu.
– / +	Change the value of a field.
F9	Used to revert all settings to their default values.
F10	Used to save all the current settings to CMOS RAM and exit the BIOS Setup.
Enter	Jumps the screen to the associated sub-menu if the current field has one (shown by a ▶ mark).

Changed BIOS Setup Settings

The BIOS Setup Program is operated using the keyboard.

If settings are changed, the new values must be either saved or discarded before the BIOS Setup Program is exited.

Reverting all settings to their default values at once

Follow the procedures below.

1. Bring up the Exit menu
2. Select "Load Setup Defaults" option
3. Press the <Enter> key - the message "Load default configuration now? Yes/No" will be displayed
4. Select "Yes" and press the <Enter> key - all settings are returned to their default values

Note

Step 2 may be directly accessed from any menu by pressing the <F9> key.

Reverting all settings to their saved values at once

Follow the procedures below.

1. Bring up the Exit menu
2. Select "Discard Changes" option
3. Press the <Enter> key - the message "Load previous configuration now? Yes/No" will be displayed
4. Select "Yes" and press the <Enter> key - all settings have been reverted to their saved values

Note

Settings cannot be reverted after changes are saved using the "Save Changes" option in the Exit menu.

Saving changed settings to CMOS RAM

Changed settings may be saved at any time from the Exit menu:

1. Bring up the Exit menu
2. Select the "Save Changes" option
3. Press the <Enter> key - the message "Save configuration changes now? Yes/No" will be displayed
4. Select "Yes" and press the <Enter> key. This saves all the BIOS Setup Program settings to CMOS RAM. BIOS Setup remains open, and further changes can be made.

Exiting the BIOS Setup Program

When exiting the BIOS Setup Program any unsaved changes must be either saved or discarded:

Saving changes and exiting the BIOS Setup Program

1. Press the <Esc> key (twice if from a sub-menu) to bring up the Exit menu
2. Select "Exit Saving Changes" option
3. Press the <Enter> key - the message "Save configuration changes and exit now? Yes/No" will be displayed
4. Select "Yes" and press the <Enter> key

You can also exit the BIOS Setup Program directly from any menu by pressing the <F10> key.

This will bring you straight to the step 3 message.

Select "Yes" and press the <Enter> key.

Exiting the BIOS Setup Program without saving changes

1. Press the <Esc> key (twice if from a sub-menu) to bring up the Exit menu
2. Select "Exit Discarding Changes" option
3. Press the <Enter> key - the message "Configuration has not been saved! Save before exiting? Yes/No" will be displayed

If no changes have been made to the settings the BIOS Setup Program will exit immediately, with no message being shown.

4. Press the < → > cursor key to select "No" and press the <Enter> key
   If you select "Yes", the changed settings will be saved to CMOS RAM.

Chapter 3 BIOS Setup Menus

This chapter explains the various menus and (configurable) fields of the BIOS Setup Program.

BIOS Setup Program Menus

The following top level menus are available from the upper menu bar:

Menu	Use	See:
Main	Basic System Configuration Settings	page 20
Advanced	Chipset Related Advanced Settings	page 25
Security	BIOS Setup Access Password Settings	page 35
Power	Power Management Settings	page 36
Boot	System Startup Related Settings	page 40
Exit	Saving Changes & Exiting the BIOS Setup Program	page 43

These menus contain a number of (configurable) fields. Some of these fields have a ▶ mark next to them. This indicates that there is a sub-menu associated with that field. These sub-menus allow further settings.

Refer

See Chapter 2 *Using BIOS Setup* for more details on how to use the BIOS Setup Program

Main Menu

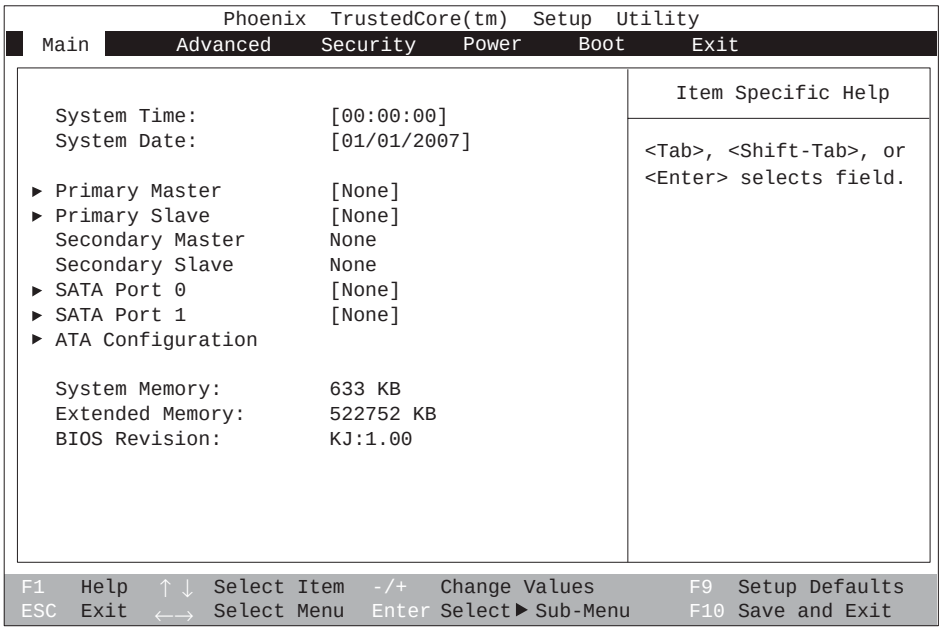
Phoenix TrustedCore(tm) Setup Utility
Main Advanced Security Power Boot Exit
System Time: [00:00:00]
System Date: [01/01/2007]
▶ Primary Master [None]
▶ Primary Slave [None]
Secondary Master None
Secondary Slave None
▶ SATA Port 0 [None]
▶ SATA Port 1 [None]
▶ ATA Configuration
System Memory: 633 KB
Extended Memory: 522752 KB
BIOS Revision: KJ:1.00
Item Specific Help
<Tab>, <Shift-Tab>, or <Enter> selects field.
F1 Help ↑ ↓ Select Item -/+ Change Values F9 Setup Defaults
ESC Exit ←→ Select Menu Enter Select ▶ Sub-Menu F10 Save and Exit

Figure 5 Main Menu

System Time Hour:Minute:Second fields. Directly input the desired value, using <Tab> or <Enter> to move between the fields.

System Date Month/Day/Year fields. Directly input the desired value, using <Tab> or <Enter> to move between the fields.

Primary Master Sets the IDE channel parameters.

Primary Slave

Secondary Master

Secondary Slave

SATA Port 0

SATA Port 1

ATA Configuration Sets the SATA and P-ATA parameters.

Refer See *Main Menu Sub-Menus*

System Memory Displays the amount of conventional memory.
This value is automatically determined during the POST phase and cannot be changed.

Extended Memory Displays the amount of extended memory.
This value is automatically determined during the POST phase and cannot be changed.

BIOS Revision Shows the current BIOS version number. This value cannot be changed.

Main Menu Sub-Menus

IDE Channel Detailed Settings

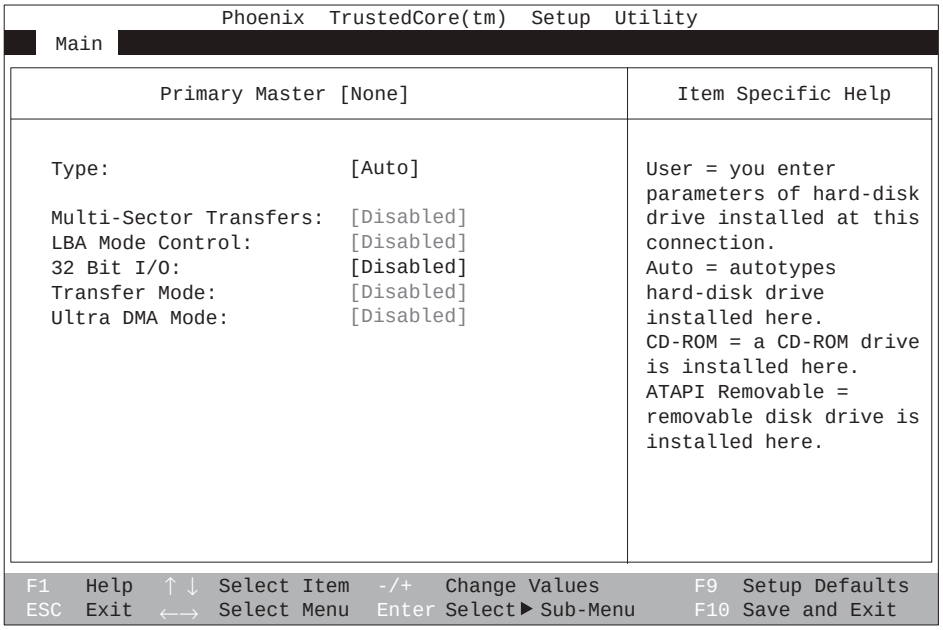
Phoenix TrustedCore(tm) Setup Utility
Main
Primary Master [None]
Item Specific Help
Type: [Auto]
Multi-Sector Transfers: [Disabled]
LBA Mode Control: [Disabled]
32 Bit I/O: [Disabled]
Transfer Mode: [Disabled]
Ultra DMA Mode: [Disabled]
User = you enter parameters of hard-disk drive installed at this connection.
Auto = autotypes hard-disk drive installed here.
CD-ROM = a CD-ROM drive is installed here.
ATAPI Removable = removable disk drive is installed here.
F1 Help ↑ ↓ Select Item -/+ Change Values F9 Setup Defaults
ESC Exit ←→ Select Menu Enter Select ▶ Sub-Menu F10 Save and Exit

Figure 6 IDE Channel Detailed Settings Sub-Menu

This screen displays the LBA derived figures for total number of sectors and available capacity of hard disks recognized by the BIOS. Number of cylinders, number of heads, number of sectors and available capacity are all shown if the size of the hard disk is 8.4GB or less.

Type Determines the connection status as well as the parameters of the IDE Disk:

- **Auto** If this option is used, the connection status and Hard Disk Type are automatically determined. If connection has been confirmed, the various parameters (No. of Cylinders, No. of Heads and No. of Sectors, etc.) will be automatically set using information obtained from the hard drive itself. The drive type and manufacturer will be displayed during POST.
- **None** No Hard Disk connected
- **CD-ROM** CD-ROM (ATAPI) connected
- **ATAPI Removable** ATAPI Removable Device (other than a CD-Drive) connected
- **User** Manually enter Hard Disk parameters (No. of Cylinders, No. of Heads and No. of Sectors, etc.)

Multi-Sector Transfers

Determines how many sectors of data each transfer contains. These settings are available if the "Type" option is set to "CD-ROM", “ATAPI Removable“ or "User":

Disabled Transfer in 1 sector units

2 Sectors – 16 Sectors
Select the number of sectors per transfer
A higher number gives faster transfer rates, but the Drive Cache size may limit the effect

LBA Mode Control Determines whether Logical Block Addressing is used or not. These settings are available if the "Type" option is set to "CD-ROM", “ATAPI Removable“ or "User":

Disabled Don’t use LBA Mode

Enabled Use LBA Mode (this setting requires that the Drive be LBA capable)

32 Bit I/O Determines whether 32-Bit I/O is used or not between the CPU and internal IDE controllers. These settings are available if the "Type" option is set to "CD-ROM", “ATAPI Removable“ or "User":

Disabled Don’t use 32-Bit I/O

Enabled Use 32-Bit I/O

Transfer Mode Determines the transfer mode. These settings are available if the "Type" option is set to "CD-ROM", “ATAPI Removable“ or "User".
A higher number gives a faster transfer rate, but the Drive must support the selected transfer mode.

Standard Set PIO Mode to 0

Fast PIO 1 – 4 Selects Fast PIO Mode 1 through 4

FPIO 3/DMA 1 Uses either Fast PIO Mode 3 or DMA Mode 1

FPIO 4/DMA 2 Uses either Fast PIO Mode 4 or DMA Mode 2

Ultra DMA Mode Determines whether Ultra DMA Transfer mode (as defined by the ATA 4 standard) is used or not. These settings are available if the "Type" option is set to "CD-ROM", “ATAPI Removable“ or "User":

Disabled Don’t use Ultra DMA mode

Mode 0 – 5 Select Ultra DMA Transfer mode (To set Ultra DMA mode the Drive must support Ultra DMA)

ATA Configuration Settings

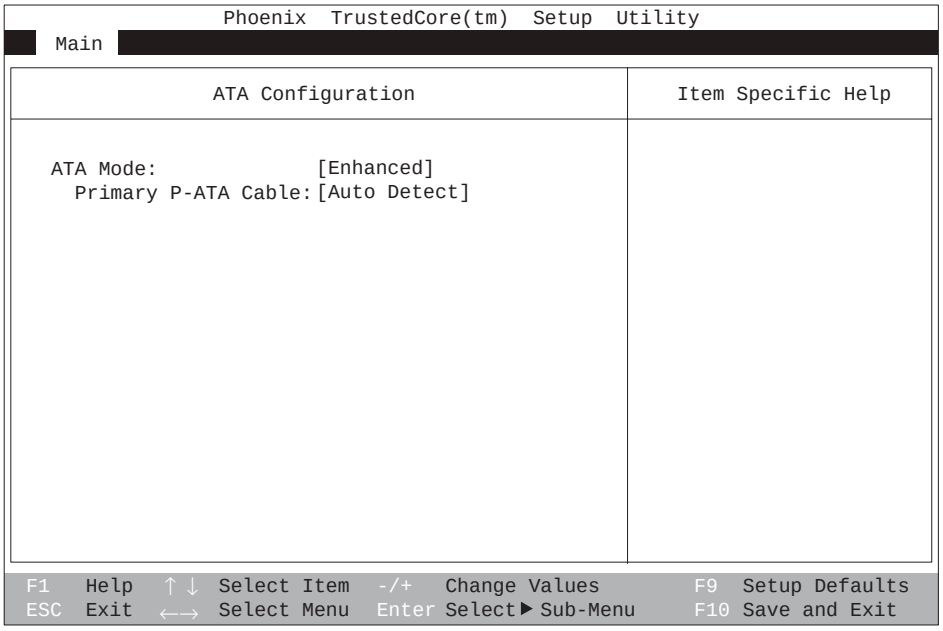
Phoenix TrustedCore(tm) Setup Utility
Main
ATA Configuration
Item Specific Help
ATA Mode: [Enhanced]
Primary P-ATA Cable: [Auto Detect]
F1 Help ↑ ↓ Select Item -/+ Change Values F9 Setup Defaults
ESC Exit ←→ Select Menu Enter Select ▶ Sub-Menu F10 Save and Exit

Figure 7 ATA Configuration Settings Sub-Menu

ATA Mode Determines whether parallel ATA (P-ATA) and/or serial ATA (SATA) may be used.

Disabled	ATA is not used.
P-ATA Only	Only P-ATA may be used.
S-ATA Only	Only SATA may be used.
Combined	Both P-ATA and SATA may be used.
Enhanced	Both P-ATA and SATA may be used. SATA runs in native mode.
RAID	Use the serial ATA RAID function.

Caution Use the "RAID" setting when booting the OS from a serial ATA RAID hard disk. Note that the 6300 ESB RAID option is also necessary to boot the OS. Contact one of our company representatives for further details.

Primary P-ATA Cable

Selects the type of P-ATA cable.

Auto	Cable type is auto-detected.
80-Wire	80-pin cable is used.
40-Wire	40-pin cable is used.

Caution

- For some IDE devices, the IDE cable type (40-Wire or 80-Wire) may not be auto detected. In this case, set the type of cable (80-Wire or 40-Wire).
- If the IDE Disk Details menu's Type option is set to "Auto", then the Ultra DMA Mode will be automatically set to the fastest value the connected device is capable of (the Plug-N-Run E1 must be rebooted first). If the auto-set Ultra DMA mode seems to be slower than it should be, try setting the P-ATA Cable option to match the cable type actually being used.

S-ATA Mode Sets the serial ATA mode used when the ATA mode is set to "S-ATA Only".

Legacy Operates as Legacy serial ATA.

Native Operates as Native serial ATA.

Refer

See *ATA Mode* in the *Serial ATA Interface* section

Advanced Menu

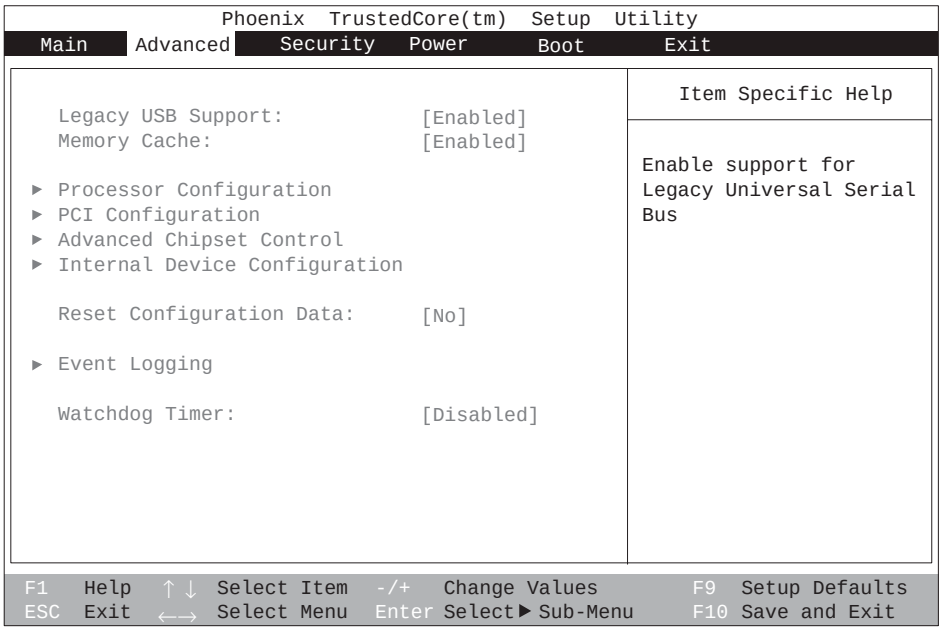
Phoenix TrustedCore(tm) Setup Utility
Main Advanced Security Power Boot Exit
Item Specific Help
Legacy USB Support: [Enabled]
Memory Cache: [Enabled]
Enable support for Legacy Universal Serial Bus
▶ Processor Configuration
▶ PCI Configuration
▶ Advanced Chipset Control
▶ Internal Device Configuration
Reset Configuration Data: [No]
▶ Event Logging
Watchdog Timer: [Disabled]
F1 Help ↑ ↓ Select Item -/+ Change Values F9 Setup Defaults
ESC Exit ←→ Select Menu Enter Select ▶ Sub-Menu F10 Save and Exit

Figure 8 Advanced Menu

Legacy USB Support

Allows USB keyboards and USB mouses to be used by OSes that do not support USB.

Enabled Legacy USB support is turned on

Disabled Legacy USB support is turned off

Caution Irrespective of what OS is being used, this option must be "Enabled" if a USB storage device (USB connected Floppy drive or CD-ROM drive) is to be recognized as a potential boot device.

Memory Cache Selects whether to use secondary caching (L2-Cache) or not.

Disabled Don't use L2-Cache

Enabled Use L2-Cache

Processor Configuration

Adjusts various processor related settings.

PCI Configuration Assigns the resources for the external PCI slots.

Refer See *PCI Device, Slot Settings* in the *Advanced Menu Sub-Menus* section

Advanced Chipset Control

Sets up the various Chipsets.

Refer See *Advanced Chipset Control Settings* in the *Advanced Menu Sub-Menus* section

Internal Device Configuration

Sets up various internal devices.

See *Internal Device Configuration Settings* in the *Advanced Menu Sub-Menus* section

Reset Configuration Data

Rebooting the system after setting this to "Yes" will cause the Extended System Configuration Data (ESCD) to be reset. This can be useful in solving PCI card (etc.) conflict related startup errors (Invalid System Configuration Data).

After the ESCD has been reset, this switch is automatically set back to "No".

Event Logging Sets the parameters for Event Logging.

See *Event Logging Settings* in the *Advanced Menu Sub-Menus* section

Watchdog Timer Selects whether to use a watchdog timer or not.

Disabled Don't use Watchdog Timer.

Enabled Use Watchdog Timer. The Watchdog Timer is started once the selected Enable Delay period has elapsed following the end of the POST phase.

If the "Watchdog Timer" is disabled, the "Output Option", "Enabled Delay", and "Timeout Delay" settings will not be shown.

Output Option Determines what happens when the Watchdog Timer times out.

System Reset A Watchdog Timeout causes the system to be reset. A POST error is also recorded in the event log.

Output Only A Watchdog Timeout causes the WDT signal to be asserted (HIGH).

See the *Plug-N-Run E1 Hardware Reference Manual* for details of the WDT signal.

Enable Delay Sets the delay imposed between the end of the POST phase and the start of the watchdog timer:

3 Seconds, 15 Seconds, 30 Seconds, 38 Seconds

Timeout Delay Sets length of the watchdog timer (from start to timeout occurring):

3 Seconds, 15 Seconds, 30 Seconds, 38 Seconds

See *Watchdog Timer* for more details.

Advanced Menu Sub-Menus

Processor Configuration Settings

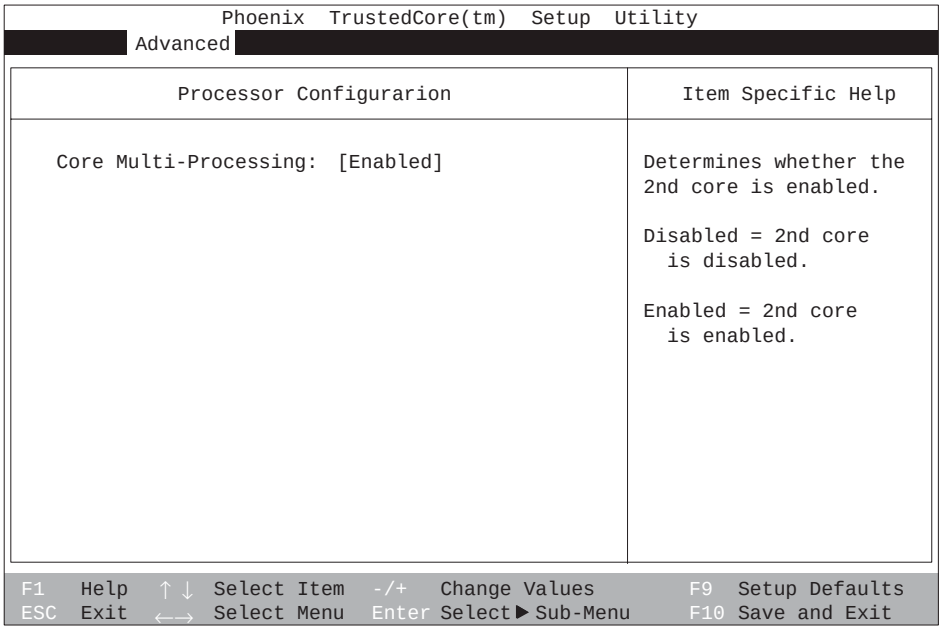
Phoenix TrustedCore(tm) Setup Utility
Advanced
Processor Configurarion
Item Specific Help
Core Multi-Processing: [Enabled]
Determines whether the 2nd core is enabled.
Disabled = 2nd core is disabled.
Enabled = 2nd core is enabled.
F1 Help ↑ ↓ Select Item -/+ Change Values F9 Setup Defaults
ESC Exit ←→ Select Menu Enter Select ▶ Sub-Menu F10 Save and Exit

Figure 9 Processor Configuration Settings Sub-Menu

Core multi-Processing

Selects how the dual core processor is used.

Enabled Enable the second core and use both cores.

Disabled Disable the second core and use only one core.

PCI Configuration Settings

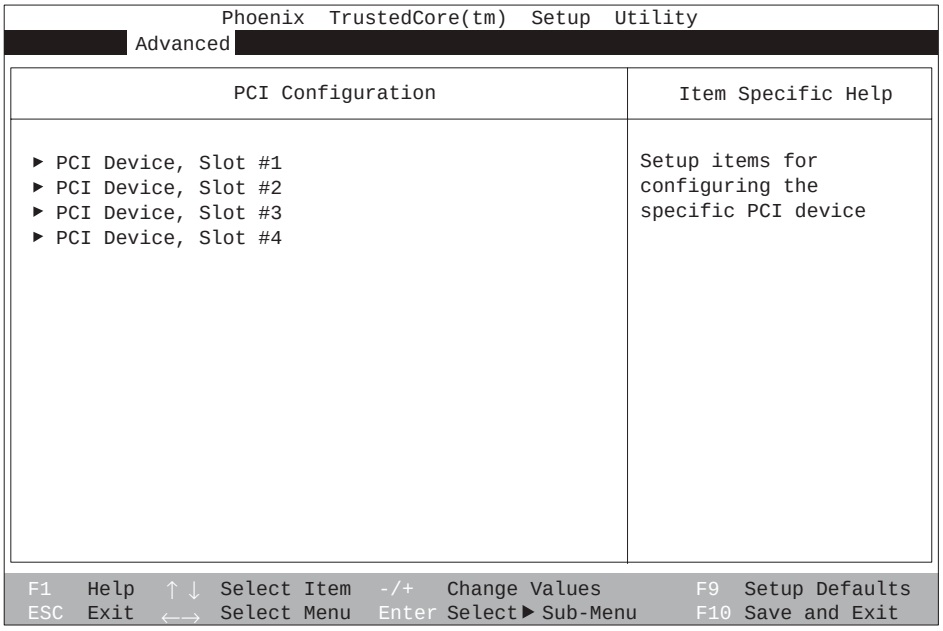
Phoenix TrustedCore(tm) Setup Utility
Advanced
PCI Configuration
Item Specific Help
▶ PCI Device, Slot #1
▶ PCI Device, Slot #2
▶ PCI Device, Slot #3
▶ PCI Device, Slot #4
Setup items for configuring the specific PCI device
F1 Help ↑ ↓ Select Item -/+ Change Values F9 Setup Defaults
ESC Exit ←→ Select Menu Enter Select ▶ Sub-Menu F10 Save and Exit

Figure 10 PCI Configuration Settings Sub-Menu

PCI Device, Slot #n Configures PCI slots #1 through #4.

Caution Slot # corresponds to the Development Board slot # as shown in the following table.

Slot #	IDSEL	Device #
1	PCI_AD20	4
2	PCI_AD21	5
3	PCI_AD22	6
4	PCI_AD23	7

See also *Plug-N-Run E1 Hardware Reference Manual* for details.

Refer See *PCI Device, Slot Settings*

PCI Device, Slot Settings

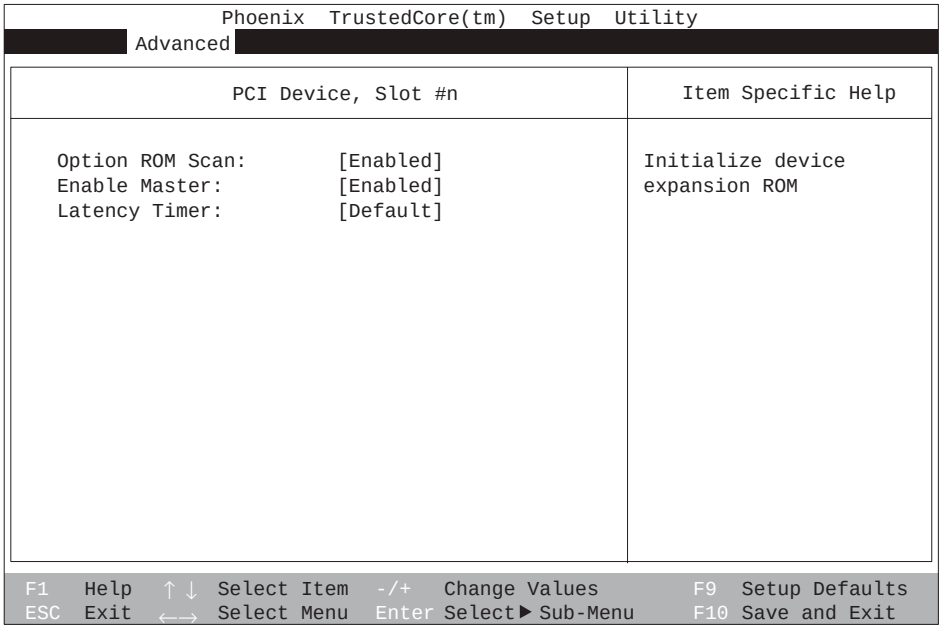
Phoenix TrustedCore(tm) Setup Utility
Advanced
PCI Device, Slot #n
Item Specific Help
Option ROM Scan: [Enabled]
Enable Master: [Enabled]
Latency Timer: [Default]
Initialize device expansion ROM
F1 Help ↑ ↓ Select Item -/+ Change Values F9 Setup Defaults
ESC Exit ←→ Select Menu Enter Select ▶ Sub-Menu F10 Save and Exit

Figure 11 PCI Device Slot Settings Sub-Menu

Option ROM Scan Defines whether or not the option ROM mounted on the PCI device is scanned.

- **Enabled** Scan the optional ROM
- **Disabled** Do not scan the optional ROM

Enable Master Defines whether or not to use the connected device as a PCI bus master device.

- **Enabled** Use as a bus master device
- **Disabled** Do not use as a bus master device

Latency Timer Defines the usage priority of the PCI bus when the connected device is used as a PCI bus master device.

- **Default** Standard priority
- **0020h – 00E0h** Define priority based on the value of the PCI bus clock. For a high speed device, better performance is realized with higher values.

Advanced Chipset Control Settings

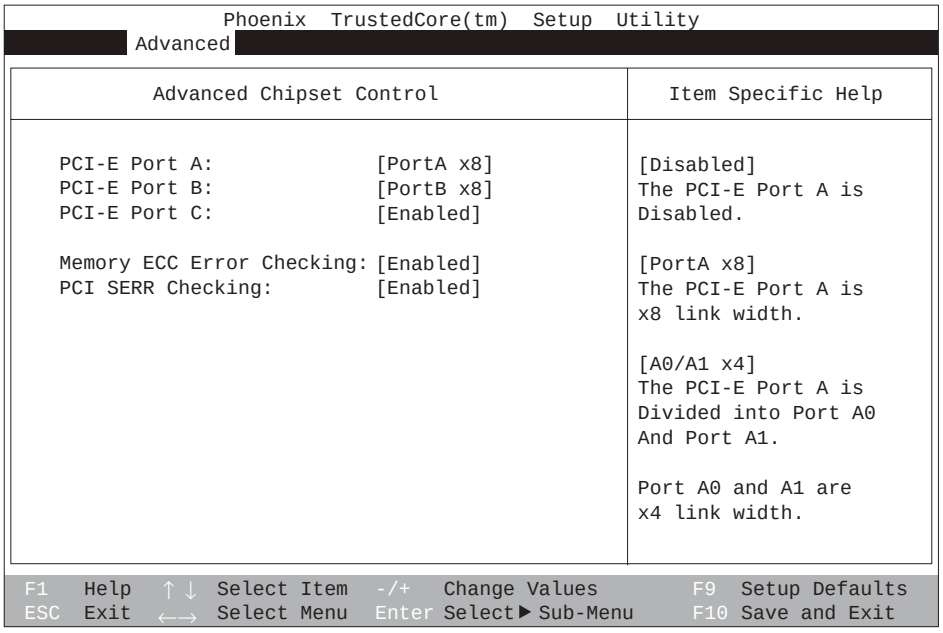
Phoenix TrustedCore(tm) Setup Utility
Advanced
Advanced Chipset Control
Item Specific Help
PCI-E Port A: [PortA x8]
PCI-E Port B: [PortB x8]
PCI-E Port C: [Enabled]
Memory ECC Error Checking: [Enabled]
PCI SERR Checking: [Enabled]
[Disabled]
The PCI-E Port A is
Disabled.
[PortA x8]
The PCI-E Port A is
x8 link width.
[A0/A1 x4]
The PCI-E Port A is
Divided into Port A0
And Port A1.
Port A0 and A1 are
x4 link width.
F1 Help ↑ ↓ Select Item -/+ Change Values F9 Setup Defaults
ESC Exit ←→ Select Menu Enter Select ▶ Sub-Menu F10 Save and Exit

Figure 12 Advanced Chipset Control Settings Sub-Menu

PCI-E Port A Sets PCI Express port A.

- **PortA x8** Use as single 8-lane port.
- **A0/A1 x4** Use as two 4-lane ports (A0/A1).
- **Disabled** Don't use port A

PCI-E Port B Sets PCI Express port B.

- **PortB x8** Use as single 8-lane port.
- **B0/B1 x4** Use as two 4-lane ports (B0/B1).
- **Disabled** Don't use port B

PCI-E Port C Sets PCI Express port C.

- **Enabled** Use as single 4-lane port.
- **Disabled** Don't use port C

Memory ECC Error Checking
Specifies whether to check for ECC memory errors or not.

- **Enabled** Memory ECC errors detected.
- **Disabled** Memory ECC errors not detected.

PCI SERR Checking Specifies whether to check for PCI bus system errors or not.

- **Enabled** Memory PCI bus system errors detected.
- **Disabled** PCI bus system errors not detected.

Internal Device Configuration Settings

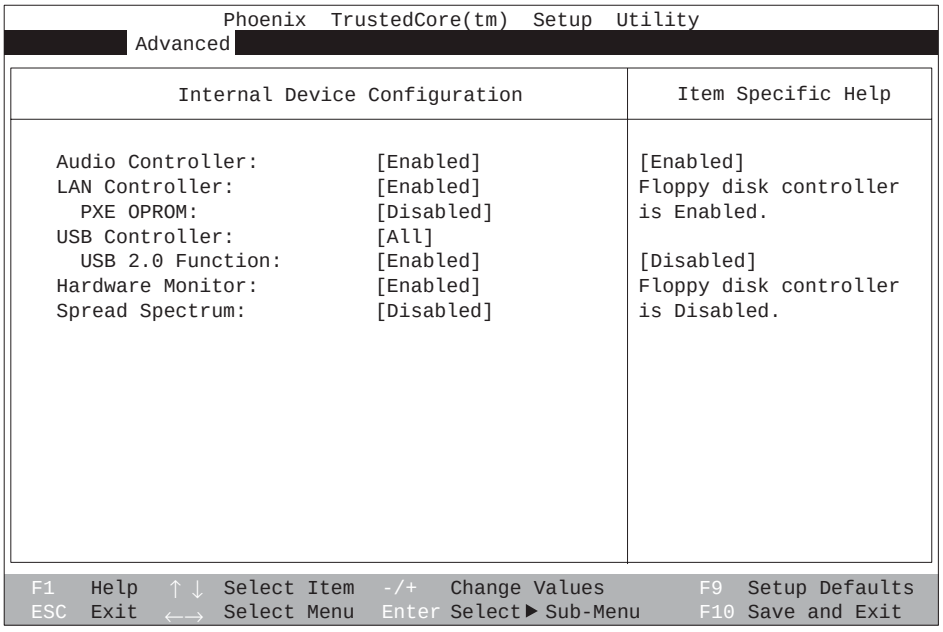
Phoenix TrustedCore(tm) Setup Utility
Advanced
Internal Device Configuration
Item Specific Help
Audio Controller: [Enabled]
LAN Controller: [Enabled]
PXE OPROM: [Disabled]
USB Controller: [All]
USB 2.0 Function: [Enabled]
Hardware Monitor: [Enabled]
Spread Spectrum: [Disabled]
[Enabled]
Floppy disk controller is Enabled.
[Disabled]
Floppy disk controller is Disabled.
F1 Help ↑ ↓ Select Item -/+ Change Values F9 Setup Defaults
ESC Exit ←→ Select Menu Enter Select ▶ Sub-Menu F10 Save and Exit

Figure 13 Internal Device Configuration Settings Sub-Menu

Audio Controller Specifies whether to use the AC'97 sound controller or not.

- **Enabled** Use the AC'97 sound controller.
- **Disabled** Don't use the AC'97 sound controller.

Caution As the Plug-N-Run E1 does not possess an AC'97 codec chip, setting the audio controller to "Enabled" will have no effect.

LAN Controller Determines whether the onboard LAN controller is used or not.

- **Enabled** Onboard LAN controller is used.
- **Disabled** Onboard LAN controller is not used

Caution If the "LAN Controller" is disabled, the "PXE OPROM" setting will not be shown.

PXE OPROM Determines whether the onboard PXE option ROM function is used or not.

- **Enabled** PXE option ROM function is used
- **Disabled** PXE option ROM function is not used

USB Controller Determines whether the onboard USB controllers is used.

- **All** All of the USB ports (#0 - #7) are usable
- **2 Port** Only two USB ports (#0 - #1) are usable
- **Disabled** None of the USB ports are usable

Caution If the "USB Controller" is disabled, the "USB 2.0 Function" settings will not be shown.

Refer Also see the *Plug-N-Run E1 Design Guide Hardware Design Considerations*.

USB 2.0 Function Determines whether the USB 2.0 or USB 1.1 functions are used.

Enabled USB 2.0 functions are used

Disabled USB 1.1 functions are used

An OS (or driver) that supports USB 2.0 will be required to use these functions.

Hardware Monitor Determines whether Hardware Monitoring is used or not.

Enabled Hardware Monitoring is used

Disabled Hardware Monitoring is not used

Spread Spectrum Determines whether the spread spectrum function is activated or not.

Enabled Spread spectrum is used

Disabled Spread spectrum is not used

Turning on the spread spectrum function reduces the EM noise output, albeit at the expense of making the system potentially less stable. Accordingly, spread spectrum should not be used if EM noise is not a problem, and otherwise only used after system stability has been evaluated.

Event Logging Settings

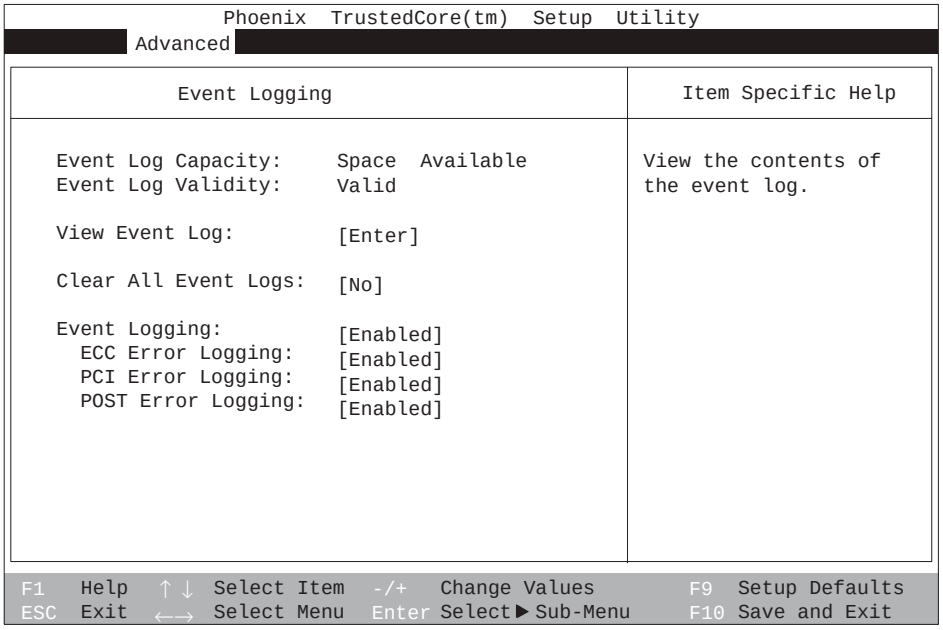
Phoenix TrustedCore(tm) Setup Utility
Advanced
Event Logging
Item Specific Help
Event Log Capacity: Space Available
Event Log Validity: Valid
View Event Log: [Enter]
Clear All Event Logs: [No]
Event Logging: [Enabled]
ECC Error Logging: [Enabled]
PCI Error Logging: [Enabled]
POST Error Logging: [Enabled]
View the contents of the event log.
F1 Help ↑ ↓ Select Item -/+ Change Values F9 Setup Defaults
ESC Exit ←→ Select Menu Enter Select ▶ Sub-Menu F10 Save and Exit

Figure 14 Event Logging Settings Sub-Menu

Event Log Capacity

Indicates the state of the Event Log area. This value cannot be changed.

Space Available Event Log area still has room to save new events

Full Event Log area has no room left to store new events

Caution

The overall size of the Event Log area is fixed, and a maximum of 127 events may be recorded.

To record new events that may occur after the "Event log capacity" option is indicated as being "Full", it is necessary to first erase the old log data by setting the "Clear all event logs" option to "Yes".

Event Log Validity Indicates whether the contents of the current Event Log are valid or not. This value cannot be changed.

Valid Current Event Log area contains valid data

Invalid Current Event Log area does not contain valid data

View Event Log Displays the contents of the Event Log area. Press the <Enter> key to check the collected Event Log records.

Note

See also *Event Log Function* in Chapter 4 *BIOS Functions*.

Clear All Event Logs

Used to erase the contents of the Event Log area.

No	Retains the current contents of the Event Log area.
Yes	Deletes the existing Event Log records. The Event Log will be cleared when the System reboots after BIOS Setup is exited. This option will then be reset to "No".

Event Logging Determines whether Event Log function is used or not.

Disabled	Event Log function is not used.
Enabled	Event Log function is used.

When this item is "Disabled", the ECC error logging, PCI error logging and POST error logging options described below will not be displayed.

ECC Error Logging Determines whether ECC error logs are collected or not.

Disabled	ECC error logs are not taken.
Enabled	ECC error logs are taken.

PCI Error Logging Determines whether PCI Error Logs are collected or not.

Disabled	PCI Error Logs are not taken.
Enabled	PCI Error Logs are taken.

POST Error Logging Determines whether POST Error Logs are collected or not.

Disabled	POST Error Logs are not collected.
Enabled	POST Error Logs are collected.

Security Menu

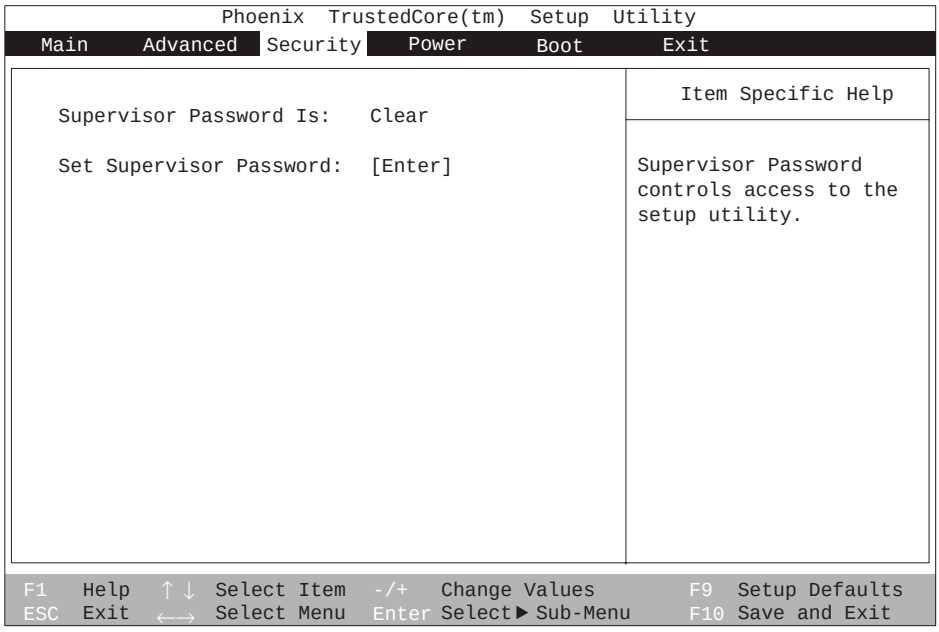
Phoenix TrustedCore(tm) Setup Utility
Main Advanced Security Power Boot Exit
Supervisor Password Is: Clear
Set Supervisor Password: [Enter]
Item Specific Help
Supervisor Password controls access to the setup utility.
F1 Help ↑ ↓ Select Item -/+ Change Values F9 Setup Defaults
ESC Exit ←→ Select Menu Enter Select ▶ Sub-Menu F10 Save and Exit

Figure 15 Security Menu

Supervisor Password Is

Displays the current state of the password that is required to start the BIOS Setup utility.

Clear	A password is not required to start the BIOS Setup utility.
Set	A password is required to start the BIOS Setup utility.

Set Supervisor Password

Sets the password that is required to start the BIOS Setup utility.

Caution

The password must comply with the following rules:

- Number of characters must be between 1 and 8
- Only alphanumeric characters (letters and numbers) may be used
- Upper and lower case letters are indistinguishable

Power Menu

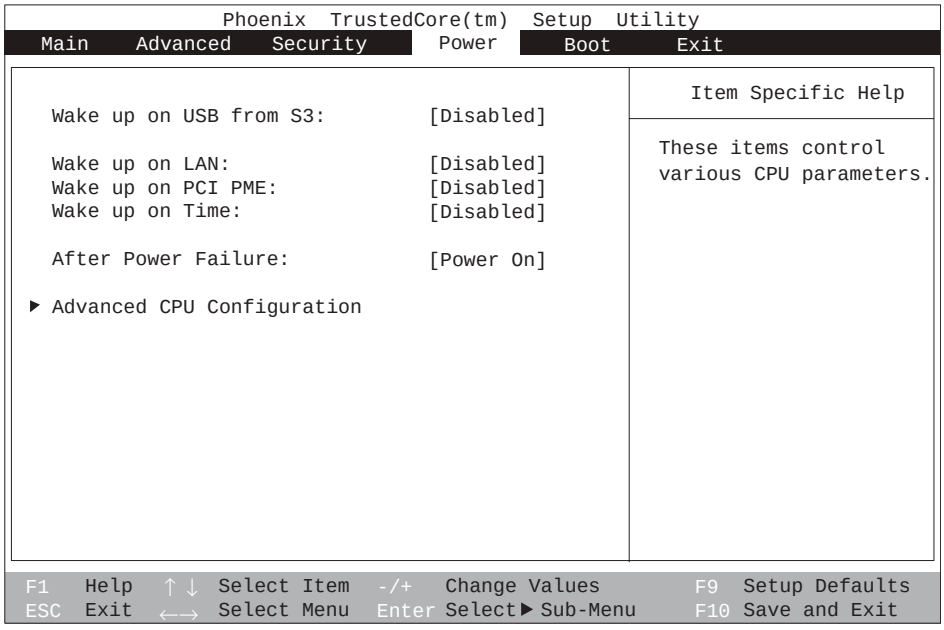
Phoenix TrustedCore(tm) Setup Utility
Main Advanced Security Power Boot Exit
Item Specific Help
Wake up on USB from S3: [Disabled]
Wake up on LAN: [Disabled]
Wake up on PCI PME: [Disabled]
Wake up on Time: [Disabled]
After Power Failure: [Power On]
Advanced CPU Configuration
These items control various CPU parameters.
F1 Help ↑ ↓ Select Item -/+ Change Values F9 Setup Defaults
ESC Exit ←→ Select Menu Enter Select ▶ Sub-Menu F10 Save and Exit

Figure 16 Power Menu

Wake up on USB from S3

Determines whether USB keyboard or mouse activity is listened for, and used to wake the system from the Standby (S3) state.

Enabled	System wakes upon detection of USB keyboard or mouse activity
Disabled	USB keyboard or mouse activity does not cause the system to wake

Caution

The wake function requires proper hardware implementation on the carrier board to function correctly.

If the standby voltage is not used for power for the device then wake functions will not work. Please refer to the *Plug-N-Run E1 Development Board Design Guide*.

Wake up on LAN

Determines whether a special packet is listened for on the network connection, and used to wake the system from the Soft-off or ACPI S5 state.

Enabled	System wakes upon receipt of the special packet
Disabled	Special packet does not cause the system to wake

Caution

The wake function requires proper hardware implementation on the carrier board to function correctly.

If the standby voltage is not used for power for the device then wake functions will not work. Please refer to the *Plug-N-Run E1 Development Board Design Guide*.

Wake up on PCI PME

Determines whether a PME signal is listened for on the PCI bus, and used to wake the system from the Soft-off or ACPI S5 state.

Enabled	System wakes upon receipt of a PME signal
Disabled	PME signal does not cause the system to wake

The wake function requires proper hardware implementation on the carrier board to function correctly.

If the standby voltage is not used for power for the device then wake functions will not work. Please refer to the *Plug-N-Run E1 Development Board Design Guide*.

Wake up on Time Determines whether and when the system is woken from the Soft-off or ACPI S5 state

Enabled	System wakes at the specified time
Disabled	System does not wake

If the “Wake up on Time” is disabled, the “Wake up Time” settings will not be shown.

Wake up Time Sets the system waking time. <Tab> and <Enter> keys are used to move between the time fields and enter time values.

After Power Failure Determines whether or not the system is automatically rebooted after a power failure.

Power On	System is rebooted after the power supply resumes.
Stay Off	System stays down even after the power supply resumes. System may be manually rebooted with the power switch (PWRSW.)
Last State	System returns to whichever state (On or Off) was in effect at the time of the power failure.

Advanced CPU Configuration

Sets the CPU's power saving modes.

See *Power Menu Sub-Menus*

Power Menu Sub-Menus

Advanced CPU Configuration Settings

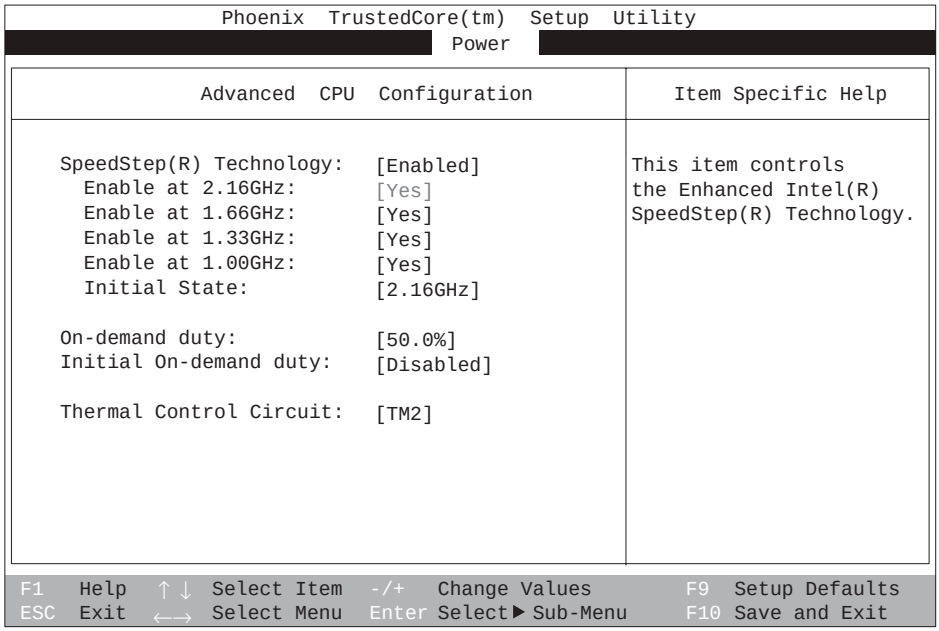
Phoenix TrustedCore(tm) Setup Utility
Power
Advanced CPU Configuration
Item Specific Help
SpeedStep(R) Technology: [Enabled]
Enable at 2.16GHz: [Yes]
Enable at 1.66GHz: [Yes]
Enable at 1.33GHz: [Yes]
Enable at 1.00GHz: [Yes]
Initial State: [2.16GHz]
On-demand duty: [50.0%]
Initial On-demand duty: [Disabled]
Thermal Control Circuit: [TM2]
This item controls the Enhanced Intel(R) SpeedStep(R) Technology.
F1 Help ↑ ↓ Select Item -/+ Change Values F9 Setup Defaults
ESC Exit ←→ Select Menu Enter Select ▶ Sub-Menu F10 Save and Exit

Figure 17 Advanced CPU Configuration Settings Sub-Menu

SpeedStep (R) Technology

Determines whether the CPU's Enhanced Intel SpeedStep® Technology is used or not.

- **Enabled** Enhanced Intel SpeedStep® Technology is on
- **Disabled** Enhanced Intel SpeedStep® Technology is off

Enable at... Specifies which internal clock speeds can be used by the Enhanced Intel SpeedStep® Technology.

- **Yes** Makes this CPU speed accessible to the operating system.
- **No** Makes this CPU speed inaccessible to the operating system.

Caution The clock speed specified as the "Initial state" cannot be set to "No".

Initial state Sets the internal clock speed used when the system is started up.

On-demand duty Sets the CPU clock throttle ratio the Plug-N-Run E1 can be initialized with.

Initial On-demand duty

Enables or disables the throttle ratio selected in the "On-demand duty" field.

- **Enabled** System starts with the CPU running at the throttle ratio specified by the "On demand duty" value
- **Disabled** System starts with the CPU running without throttling

Thermal Control Circuit

Determines what happens when the CPU temperature exceeds a preset threshold for the junction temperature.

TM1	Thermal Monitor 1 (run CPU at 50% duty ratio)
TM2	Thermal Monitor 2 (run CPU at specified Enhanced Intel SpeedStep® clock speed)
Disabled	Thermal Control Circuit is ignored.

Boot Menu

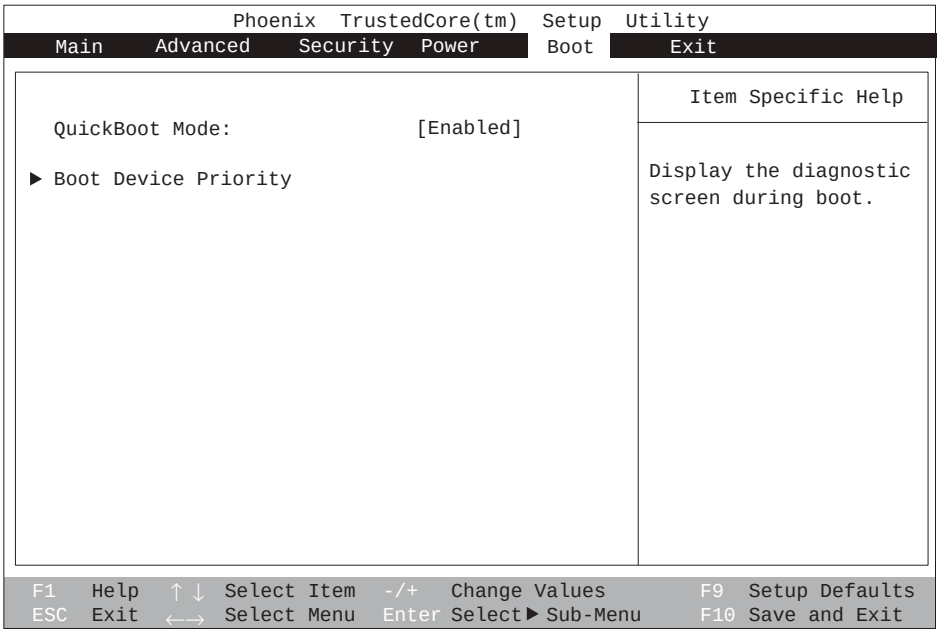
Phoenix TrustedCore(tm) Setup Utility
Main Advanced Security Power Boot Exit
Item Specific Help
QuickBoot Mode: [Enabled]
▶ Boot Device Priority
Display the diagnostic screen during boot.
F1 Help ↑ ↓ Select Item -/+ Change Values F9 Setup Defaults
ESC Exit ←→ Select Menu Enter Select▶ Sub-Menu F10 Save and Exit

Figure 18 Boot Menu

QuickBoot Mode Selects whether to use QuickBoot or not:

Enabled Shortens time needed for POST checking by skipping/reducing the memory tests, etc.

Disabled Performs normal POST checking

Caution

- QuickBoot is not used if a CMOS checksum error occurs at startup:

  System CMOS checksum bad - Default configuration used

- QuickBoot will not be used from the next startup if a POST error other than a CMOS checksum error occurs
- QuickBoot will be used again from the next startup when a startup completes without any errors occurring

Boot Device Priority

Defines the order to use in deciding which boot device to use as the start-up device

Refer

See *Boot Menu Sub-Menus*

Boot Menu Sub-Menus

Boot Device Priority

This list defines the order in which the different available drives are checked for use as the start-up device. The order of devices on the list and boot enabled/disabled setting may be changed as follows:

Key	Function
+	Moves the device under the cursor up the list.
-	Moves the device under the cursor down the list.
Shift + 1	Toggles the boot enabled/disabled setting of the device under the cursor.
x key	Switches the entry between the "Boot priority order" and "Excluded from boot:" lists.
r key	If the entry has an <R/F> notation, causes the floppy disk drive (A:) letter to be assigned at startup.
f key	Causes the hard disk drive (C:) letter to be assigned at startup.

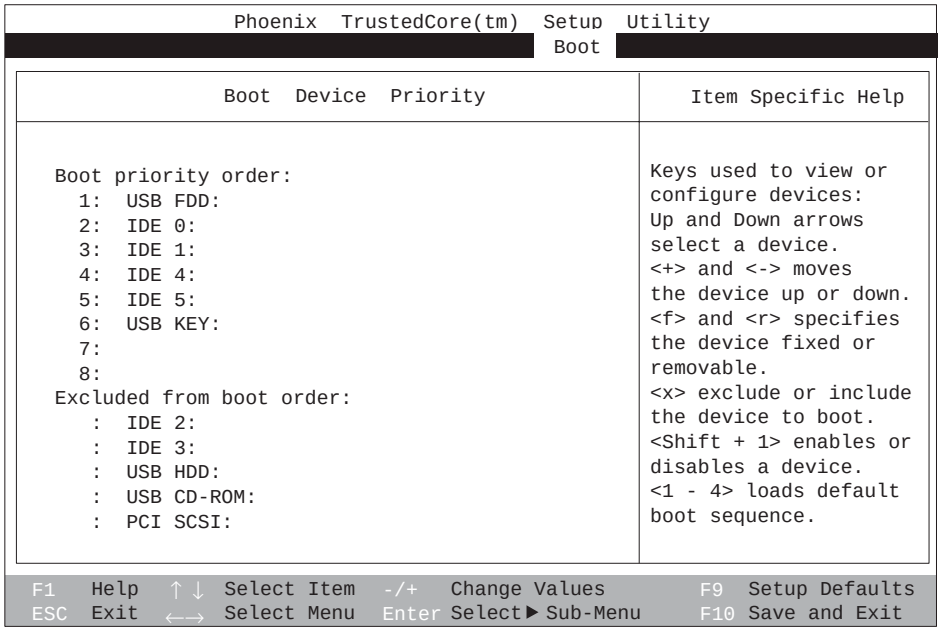
Phoenix TrustedCore(tm) Setup Utility
Boot
Boot Device Priority
Item Specific Help
Boot priority order:
1: USB FDD:
2: IDE 0:
3: IDE 1:
4: IDE 4:
5: IDE 5:
6: USB KEY:
7:
8:
Excluded from boot order:
: IDE 2:
: IDE 3:
: USB HDD:
: USB CD-ROM:
: PCI SCSI:
Keys used to view or configure devices:
Up and Down arrows select a device.
<+> and <-> moves the device up or down.
<f> and <r> specifies the device fixed or removable.
<x> exclude or include the device to boot.
<Shift + 1> enables or disables a device.
<1 - 4> loads default boot sequence.
F1 Help ↑ ↓ Select Item -/+ Change Values F9 Setup Defaults
ESC Exit ←→ Select Menu Enter Select ▶ Sub-Menu F10 Save and Exit

Figure 19 Boot Device Priority Settings Sub-Menu

Legacy Floppy Drives
Boots from a floppy disk drive connected to the FDD connector.

USB FDD Boots from a floppy disk drive connected to the USB port.

IDE 0 Boots from a storage device connected to the indicated IDE or SATA connector.

IDE 1

IDE 2

IDE 3

IDE 4

IDE 5

USB KEY Boots from a flash memory (etc.) storage device connected to the USB port.

USB HDD Boots from a hard disk connected to the USB port.

USB CD-ROM Boots from a CD-ROM/DVD-ROM connected to the USB port.

PCI SCSI Boots from a storage device connected via a PCI card or PCI Express card.

PCI BEV/Legacy Network Card
Boots from a network device connected via the onboard LAN controller, PCI card, or the network connected via the PCI Express card.

Exit Menu

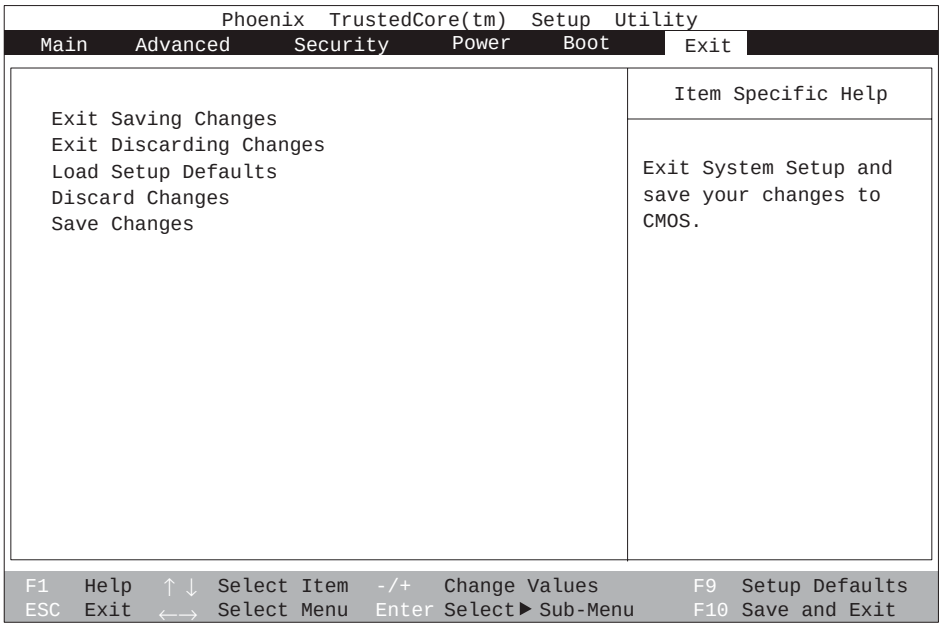
Phoenix TrustedCore(tm) Setup Utility
Main Advanced Security Power Boot Exit
Item Specific Help
Exit Saving Changes
Exit Discarding Changes
Load Setup Defaults
Discard Changes
Save Changes
Exit System Setup and save your changes to CMOS.
F1 Help ↑ ↓ Select Item -/+ Change Values F9 Setup Defaults
ESC Exit ←→ Select Menu Enter Select ▶ Sub-Menu F10 Save and Exit

Figure 20 Exit Menu

Exit Saving Changes
Saves the settings to CMOS RAM before exiting BIOS Setup Program

Exit Discarding Changes
Exits BIOS Setup without saving any changes

Load Setup Defaults
Returns all settings to their factory default values

Discard Changes Returns all settings to the values stored in CMOS RAM

Save Changes Saves the current settings to CMOS RAM

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Chapter 4 BIOS Functions

This chapter explains the details of a variety of BIOS functions.

Booting from any Device

The Plug-N-Run E1 may be booted from any connected bootable device, including floppy disks, hard disks, and CD-ROM disks, etc.

The boot priority applied is freely changeable in BIOS Setup.

Refer

See *Boot Menu Sub-Menus*

Power Management Functions

Plug-N-Run E1 modules provide both ACPI 2.0 and Enhanced Intel SpeedStep® Technology power management functions to provide the following power saving features when used with Windows® XP and Windows Vista™:

Note

- ACPI is a set of power management related conventions implemented by Intel, Microsoft, Phoenix, etc.
- Enhanced Intel SpeedStep® Technology is an Intel Core™ 2 Duo Processor function that allows the CPU core voltage and speed to be adjusted on the fly.

Sleep States

Sleep states save power by cutting the power supply to a number of the Plug-N-Run E1 module's (non-vital) component devices. Only the ACPI "S3" low-power state (Device states are saved to memory and then power is cut to the CPU and other non-memory devices) is supported.

The Plug-N-Run E1 module wakes up faster from a Sleep State than from the Hibernation, so its use is recommended when the System is not going to be used for a short time only.

Refer

See *Power Menu*

Hibernation

Otherwise known as the ACPI "S4" low-power state, when Hibernation is requested all memory contents and device states are saved to a special file on the hard disk and the Plug-N-Run E1 module's power is the cut. When the System is woken up, the memory contents and device states are returned to the condition they were in before the move to Hibernation was initiated.

The Plug-N-Run E1 module consumes less power in the Hibernation than in a Sleep State, so its use is recommended when the System is not going to be used for a long time.

Wake Up

The Plug-N-Run E1 may be woken up from a low power state by use of any of the following:

- Pressing the Power Button
- Real Time Clock Alarm
- Wake on LAN via the onboard LAN Controller
- PME signal from PCI Slot #1 - #4
- PCI Express slot PME signal

The Plug-N-Run E1 may also be woken up from the ACPI S1 Sleep State by a USB Keyboard or USB Mouse event.

CPU Power Saving Functions

Support for Enhanced Intel SpeedStep® Technology is natively supported in Windows® XP and Windows Vista™.

BIOS Setup with Enhanced Intel SpeedStep® Technology may be used to control the following Plug-N-Run E1 CPU power saving functions:

- Whether the Enhanced Intel SpeedStep® Technology is available or not
- Setting the Enhanced Intel SpeedStep® Technology CPU speeds accessible to the operating system.
- CPU speed used after Plug-N-Run E1 startup
- CPU clock throttle ratios
- CPU clock throttle ratio used after Plug-N-Run E1 startup

Thermal Monitoring Functions

Thermal monitoring is achieved by means of a Thermal Control Circuit that is built into the Plug-N-Run E1's Intel Core™ 2 Duo processor.

The Thermal Control Circuit is a safety feature that is designed to prevent the CPU from being damaged when its temperature rises above the normal operating range.

BIOS Setup may be used to control the following Plug-N-Run E1 thermal monitoring functions:

- Thermal Control Circuit operating mode

Event Log Function

How the Event Log Function Works

1 Outline

The BIOS is able to write to an Event Log area in the GPNV (General Purpose Non-Volatile) memory if any of the following errors occur. Event Log records can be read with "View event log" function of BIOS Setup Menu and/or BIOS runtime routine.

- **ECC Errors**

  Both correctable errors and uncorrectable errors are detected for and recorded in the log.

  Correctable errors are automatically corrected, and a log entry is recorded, but have no further effect on operation.

  Uncorrectable errors are not automatically corrected, and after the BIOS has collected the log information, an NMI is generated. If the OS has altered the memory vector, the OS then assumes responsibility for handling the NMI. If the memory vector has not been altered, the system simply halts.

- **POST Errors**

  Any errors that occur during the POST phase are recorded. In principle, most errors that are displayed on the POST screen as "XXXX:YYYYYYYY" (where XXXX is a 4-digit number) will be recorded.

- **PCI Errors**

  Any errors from PCI devices (SERR#) are recorded. The applicable PCI bus number, device number and function number will be recorded for each error.

2 Event Log Messages

When the BIOS Setup "View event log" function is used, the Event Log records are displayed using the following format.

- **Message Format**

  Event Log entries record the time/date the log was taken and an event type message:

  Date Time Description

01/01/2007 14:58:36 Pre-Boot Error: CMOS Configuration Error

  Note Date and time are provided by the system clock. If the system is run without a CMOS battery, this date and time may be meaningless.

- **Message List**

Table 5 List of Event Log Message

Message	Description
Correctable ECC Error:Channel A or Correctable ECC Error:Channel B	Correctable ECC Error in Channel A or Channel B
Uncorrectable ECC Error:Channel A or Uncorrectable ECC Error:Channel B	Uncorrectable ECC Error in Channel A or Channel B
Pre-Boot Error:Channel 2 Timer Not Functional	System timer error
Pre-Boot Error:CMOS Battery Failure	Drained backup battery Replace the battery & rerun BIOS Setup
Pre-Boot Error:CMOS Checksum Error	Invalid CMOS RAM data Default values used for some settings
Pre-Boot Error:CMOS Configuration Error	Last startup failed Default values used for some settings
Pre-Boot Error:Keyboard Locked	Keyboard is in a locked state
Pre-Boot Error:Keyboard Not Functional	Keyboard non-operational error
Pre-Boot Error:Keyboard Controller Not Functional	Keyboard controller error
Pre-Boot Error:Cache Memory Error	System cache error
Pre-Boot Error:Floppy Drive A Error	Floppy disk (drive A:) error
Pre-Boot Error:CMOS Time Not Set	Indeterminate Time/Date setting
Pre-boot Error:WatchDog timeout	Timeout by the Watchdog Timer caused the system to be reset
PCI System Error (xxxxh, yyyyh, zzzzh)	PCI system error (SERR#)
No event log records found	Event Log Area is empty

- **PCI Error Details**
  - xxxxh shows the applicable PCI bus number, device number and function number for the PCI System Error (SERR#), using the following bit structure:

Bits	Contain
15 – 8	Bus number
7 – 3	Device number
2 – 0	Function number

  - yyyyh shows the value (offset = 06h) of the status register of the device that raised the PCI System Error (SERR#).
  - zzzzh shows the value (offset = 1Eh) of the secondary status register of the PCI-PCI bridge that raised the PCI System Error (SERR#). If the device is not a PCI-PCI bridge, the value FFFFh is inserted.

Event Log Area

Figure 21 shows the structure of the Event Log, including the format of an Event Log record.

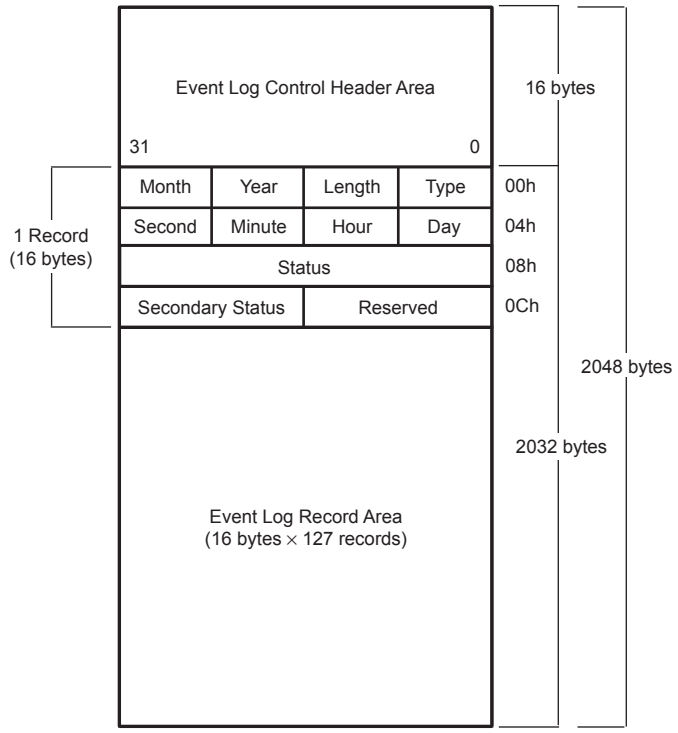


Figure 21 Event Log Area & Record Format

- **Type**

  Indicates the log type. May assume the following values, depending on the error type:

  01h : Correctable ECC Error
  02h : Uncorrectable ECC Error
  08h : POST error
  0Ah : PCI error

- **Length**

  Indicates the record length. For the Plug-N-Run E1, this is fixed at 16 bytes.

- **Year**

  Indicates the year the log was taken (using BCD format).

  80h - 99h indicate the years 1980 - 1999, while 00h - 79h indicate the years 2000 - 2079.

- **Month**

  Indicates the month the log was taken (using BCD format).

- **Day**

  Indicates the day the log was taken (using BCD format).

- **Hour**

  Indicates the hour the log was taken (using BCD format).

- **Minute**

  Indicates the minute the log was taken (using BCD format).

- **Second**

  Indicates the second the log was taken (using BCD format).

- **Status**

  Type dependent detail value:

  - ECC Memory Errors
    Indicates the channel number of the memory area where the error occurred.
  - POST Errors
    A bit indicates that the following error has occurred. Multiple errors during the POST phase will therefore result in multiple bits being set.

Table 6 POST Error Status Bitmap

Bit Position	Meanings
0	TIMER FAIL
3	CMOS BATTERY
5	CHECK SUM ERROR
6	CMOS CONFIG FAIL
8	KBD LOCKED
9	KBD FAIL
10	KBD CONTROLLER FAIL
13	CACHE FAIL
14	FLOPPY FAIL
18	RTC INVALID DATE TIME
28	WATCHDOG TIMEOUT

- **Reserved**

  Reserved for future use.

Event Log BIOS Runtime Routines

The Event Log function provides the following runtime routines as additions to the normal PnP runtime services:

See the "Plug and Play BIOS Specification Version 1.0A" for more details of the PnP BIOS specification (available for download from the Microsoft Web-site). See also the "System Management BIOS Reference Specification Version 2.3.1" for more details (available for download from the Intel Web-site).

1 Read GPNV Data Function

- **Synopsis**

  short Far(*entryPoint)(Function, Handle, GPNVBuffer, GPNVLock, GPNVSelect, BiosSelector);

  short Function;

  unsigned short Handle;

  unsigned char far *GPNVBuffer;

  short far *GPNVLock;

  unsigned short GPNVSelect;

  unsigned int BiosSelector;

- **Parameters**

Function :	0056h (fixed)
Handle :	0 (fixed)
GPNVBuffer :	Address of the buffer for the GPNV data. A 2048-byte buffer size is required.
GPNVLock :	FFFFh (fixed)
GPNVSelect :	Selector value for the area to which GPNV is mapped (enabled when 16-bit Protect Mode is used)
BiosSelector :	Arbitrary value (has no meaning for this particular function)

- **Description**

  Transfers the GPNV (General Purpose Non Volatile) data area (equivalent to the GPNV handle) to the specified buffer address.

  Caution

  This is only usable when running in real mode.

- **Returns**

  The following two return codes are explicit to this function. See the PnP BIOS specification for other return codes.

0000h :	Successful
0083h :	Invalid handle designated

2 Clear Event Log

- **Synopsis**

  short Far(*entryPoint)(Function, BiosSelector);

  short Function;

  unsigned short BiosSelector;

- **Parameters**

Function :	8000h (fixed)
BiosSelector :	Arbitrary value (has no meaning for this particular function)

- **Description**

  Clears the Event Log area.

  Calling this function writes a Clear Event Log request to the GPNV. This is only usable when running in real mode. The actual timing of the Event Log area being cleared is as follows:

  - the next time the System is started up or rebooted
  - when a new event occurs after the Clear Event Log has been issued

  This is only usable when running in real mode.

- **Returns**

  The following return code is explicit to this function. See the PnP BIOS specification for other return codes.

  0000h : Successful

Password Function

A password may be set to prevent BIOS Setup from being accessed by unauthorized users.

Once set, users who do not know the correct password will not be able to use BIOS Setup.

The password must comply with the following rules:

- Number of characters must be between 1 and 8
- Only alphanumeric characters (letters and numbers) may be used
- Upper and lower case letters are indistinguishable

Setting a password

In the BIOS Setup Security menu, move the cursor to the "Set Supervisor Password" field, and press the <Enter> key.

If a password is not currently set, the following password entry window appears:

Set Supervisor Password	
Enter New Password [	]
Confirm New Password [	]

Enter the password that you wish to set in both the "Enter New Password" field and the "Confirm New Password" field, then press the <Enter> key.

Changing the password

In the BIOS Setup Security menu, move the cursor to the "Set Supervisor Password" field, and press the <Enter> key.

If a password is currently set, the following password entry window appears:

Set Supervisor Password	
Enter Current Password [	]
Enter New Password [	]
Confirm New Password [	]

Enter the old password in the "Enter Current Password" field, and press the <Enter> key, then enter the new password that you wish to set in both the "Enter New Password" field and the "Confirm New Password" field, and press the <Enter> key again.

Deleting the password

In the BIOS Setup Security menu, move the cursor to the "Set Supervisor Password" field, and press the <Enter> key.

If a password is currently set, the following password entry window appears:

Set Supervisor Password	
Enter Current Password	[ ]
Enter New Password	[ ]
Confirm New Password	[ ]

Enter the old password in the "Enter Current Password" field, and press the <Enter> key, then press the <Enter> key again without entering a new password in either the "Enter New Password" field or the "Confirm New Password" field.

Accessing BIOS Setup after a password is set

If a password has been set, then when BIOS Setup is started, the following password entry window appears:

Enter Password	[ ]

Enter the current password in the "Enter Password" field, then press the <Enter> key.

Entering the wrong password

If the wrong password is entered three times in a row when BIOS Setup is started with a password set, or when changing the current password, the System beeps once, then the following message is displayed, and the System is locked:

System Disabled

If this message appears, you will need to press the "Reset" button, or cut the power, then enter the correct (current) password after restarting the system.

Serial ATA Interface

SATA Features

Faster Transfer Rates
SATA allows data transfers of up to 150MB/s, a 50% improvement on the maximum 100MB/s of the older parallel ATA (P-ATA) IDE interface.

Improved Cabling
SATA uses a 7-conductor cable, which are much thinner and more flexible than the old 40/80-conductor P-ATA cables, so wiring the cabinet is easier. The connectors have also been improved to reduce the potential for trouble when attaching/removing the cables.

No Jumpers
Each SATA cable is only used to connect a single device. As a result SATA devices have no need for the master/slave ID jumpers required by P-ATA devices.

Easy Software Migration

SATA provides a parallel ATA emulation mode to maintain software compatibility. As this allows continued use of most PATA software and drivers, the migration to SATA is eased.

ATA Mode

ATA supports the following five modes:

P-ATA Only

Only parallel ATA devices may be used.

Both the primary port and secondary port are available.

Serial ATA cannot be used.

S-ATA Only

Only serial ATA devices may be used.

Divided into two sub-modes.

- Legacy mode
  SATA devices operate as a the primary master and secondary master, and standard resources are used.
- Native mode
  SATA devices operate in a different mode to the primary port and secondary port and arbitrarily assigned resources may be used as per other PCI devices. Interrupts become PCI interrupts, so the individual port interrupts (IRQ14, 15) are released.

Combined

This mode emphasizes standard compatibility for use of both parallel ATA and serial ATA devices.

This mode operates as follows:

- P-ATA Primary
  The parallel ATA primary port and the serial ATA secondary port are available. The parallel ATA secondary port cannot be used.

Enhanced

This mode allows use of both parallel ATA and serial ATA devices, such that the maximum configuration can be connected. The parallel ATA uses both the primary port and secondary port may both be used. The serial ATA operates in Native mode.

RAID

Uses two internal serial ATA drives to construct a RAID drive. The parallel ATA, primary port and secondary port can still be used.

ATA Mode and Channel Assignments

Table 7 shows how different channels are assigned for each possible ATA Mode setting of the BIOS Setup ATA Configuration menu. These IDE channels correspond to the four IDE Channels shown on the BIOS Setup Main menu.

Table 7 ATA Mode & Channel Assignments

IDE Channel / ATA Mode / S-ATA Mode	P-ATA Only	S-ATA Only		Combined	Enhanced	RAID
		Legacy	Native	P-ATA Primary		
Primary Master	P-ATA Primary Master	—	—	P-ATA Primary Master	P-ATA Primary Master	P-ATA Primary Master
Primary Slave	P-ATA Primary Slave	—	—	P-ATA Primary Slave	P-ATA Primary Slave	P-ATA Primary Slave
Secondary Master	P-ATA Secondary Master	—	—	S-ATA Secondary Master	P-ATA Secondary Master	P-ATA Secondary Master
Secondary Slave	P-ATA Secondary Slave	—	—	S-ATA Secondary Slave	P-ATA Secondary Slave	P-ATA Secondary Slave
SATA Port 1	—	S-ATA Primary Master	S-ATA (Native) Primary	—	S-ATA (Native) Primary	RAID
SATA Port 2	—	SATA Secondary Master	S-ATA (Native) Secondary	—	S-ATA (Native) Primary	

Caution

- Always use the mode that was in force when the OS was installed. If the mode is changed, the OS may become unbootable.
- Depending on the RAID settings purchase of a 6300 ESB RAID option may be necessary to allow the OS to boot from the serial ATA hard disk. Contact one of our company representatives for further details.

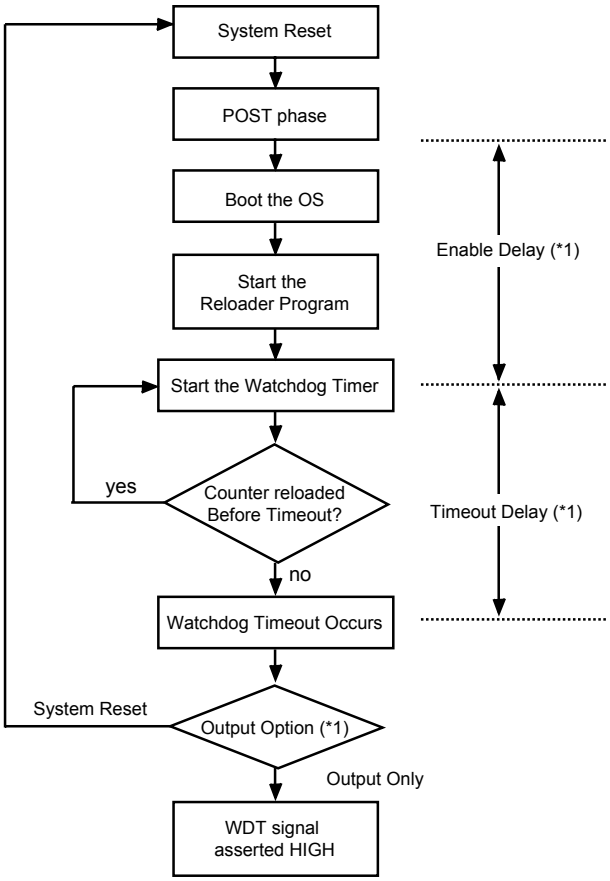
Refer

See *ATA Configuration Settings* in the *Main Menu Sub-Menus* section and *Internal Device Configuration Settings* in the *Advanced Menu Sub-Menus* section.

Watchdog Timer

Purpose of the Watchdog Timer

In certain worst-case situations, an OS or application problem can cause the system to hang, rendering it unresponsive and unusable. The watchdog timer function is provided to deal with this problem, allowing the system to be forcibly reset if a hang-up state is detected. As shown in Figure 22, the Watchdog Timer mechanism requires that a counter be constantly reloaded, each time before the Watchdog Timer expires. If a hang-up state prevents the timer from being reset, then a timeout occurs and the system can be reset.



***1** See *Advanced Menu* for details of the Output Option, Enable Delay and Time-out Delay BIOS settings.

Figure 22 Hang-up Detection with the Watchdog Timer

What happens when a Watchdog timeout occurs depends on which of the following settings has been assigned to the Output Option in the BIOS Setup:

- System Reset — A Watchdog timeout causes the system to be reset. A POST error is also recorded in the event log.
- Output Only — A Watchdog timeout causes the WDT signal is asserted (HIGH).

Refer See the *Plug-N-Run E1 Hardware Reference Manual* for details of the WDT signal.

Using the Watchdog Timer

To use the watchdog timer, the following steps are necessary:

- Setup the Watchdog Timer in the BIOS Setup Advanced menu.
- Prepare a program that is able to regularly reload the Watchdog Timer counter.
- Set the reloader program to automatically be run after the OS has booted.

Reloading the Counter

After watchdog timer has been started, its counter may be reloaded by writing (any value) to the TC01_RLD register (at offset 1060h), using a scheme such as the following:

```
mov   dx, 1060h              ; Write TCO1_RLD regs.
out   dx, al
```

This will cause the Watchdog Timer's counter to be reset to the Timeout Delay value from the BIOS Setup.

Remember that the reloader program must be set to keep reloading the counter before the previously reloaded Timeout Delay interval can expire.

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Appendix A Cautions & Limitations

This appendix contains cautions and limitations pertaining to the use of various operating systems on the Plug-N-Run E1.

In this chapter Microsoft® Windows® XP Professional Operating System is abbreviated to Windows® XP, and Microsoft® Windows Vista™ operating system is abbreviated to Windows Vista™.

Outline

The Plug-N-Run E1 is compatible with the following operating systems:

- Windows® XP
- Windows Vista™

Installing Drivers

Drivers may be required to be installed, depending on the OS to be installed.
Also, when using Plug-N-Run G5 Development Board (model name: PS5PRDEVBRD), additional installation of drivers may be required to use peripheral devices.
Contact your sales representative to obtain these drivers.
Refer to the README attached with the driver for how to install the driver.

Notes on Using Peripheral devices Made by Other Companies

Caution

Check the following to use peripheral devices made by other companies.

- Plug-N-Run E1 satisfies hardware requirements of the peripheral devices to be used.
- When the peripheral devices requires drivers, the newest version of the driver is installed.
- When the peripheral devices requires drivers, the newest version of the driver is installed.
- The peripheral devices supports the power management (suspend resume) function.
    - Some problems may occur if connecting the peripheral devices that do not support power management function and shifting to suspend mode.
- Plug-N-Run E1 satisfies other requirements of the peripheral devices to be used.
    - Some failures may occur in certain combination of the peripheral devices,even if the peripherals operate with no failures independently.

Appendix B Use of Legacy Devices

This appendix details how legacy devices may be used with the Plug-N-Run E1.

Note that the following types of devices are considered legacy devices:

- PS/2 keyboards, PS/2 mouses
- Floppy drives (excluding USB connectables)
- Parallel port connectables
- Serial port connectables

Which Legacy Devices?

The BIOS type/version and type(s) of Super I/O chip(s) mounted determine which legacy devices are available for use. Table 8 shows the resulting availability matrix:

Table 8 Legacy Devices Conditions

System Configuration				Devices Usable				
BIOS Type	BIOS Version	Super I/O chip?		PS/2 KB/ MS	FDD	Parallel port	Serial port	
		Primary SCH5017	Secondary SIO10N268				A, B	C, D, E, F
Standard BIOS (COM Express Compatible)	KL: 1.00 or later	Not Present	Not Present	NG	NG	NG	NG	NG
			Present	NG	NG	NG	NG	OK
		Present	Not Present	NG	OK	OK	OK	NG
			Present	NG	OK	OK	OK	OK
PS/2 BIOS (PS/2 Compatible)	KJ: 1.00 or later	Not Present	Not Present	BIOS startup error. The PS/2 BIOS mandates the presence of the SCH5017 chip.				
			Present					
		Present	Not Present	OK	OK	OK	OK	NG
			Present	OK	OK	OK	OK	OK

BIOS Type

Either of the following two BIOS types may be used with the Plug-N-Run E1:

- Standard BIOS

  The BIOS that is normally found in a Plug-N-Run E1. This BIOS does not require that a Super I/O chip be present for the system to function, but on the other hand, also does not allow the use of a PS/2 keyboard and mouse.

- PS/2 BIOS

  A special BIOS that is PS/2 compatible. This BIOS allows the use of a PS/2 keyboard and/or mouse, but also requires the use of the SCH5017 Super I/O chip from SMSC. Contact your sales representative to obtain a PS/2 compatible BIOS.

Super I/O

Plug-N-Run E1 systems support the use of the following Super I/O chips as controllers for legacy devices:

Primary

- SCH5017 (SMSC)

Secondary

- SIO10N268 (SMSC)

These Super I/O chips should be added to a Plug-N-Run E1 carrier board as required. It should be noted that both of these chips are mounted on the Plug-N-Run G5 Development Board (PS5PRDEVBRD).

BIOS Setup Changes (Due to the SCH5017)

When a SCH5017 Super I/O chip (from SMSC) is used, a variety of changes occur in the BIOS Setup menus.

Main Menu

A "Legacy Diskette A" option is added to the Main Menu:

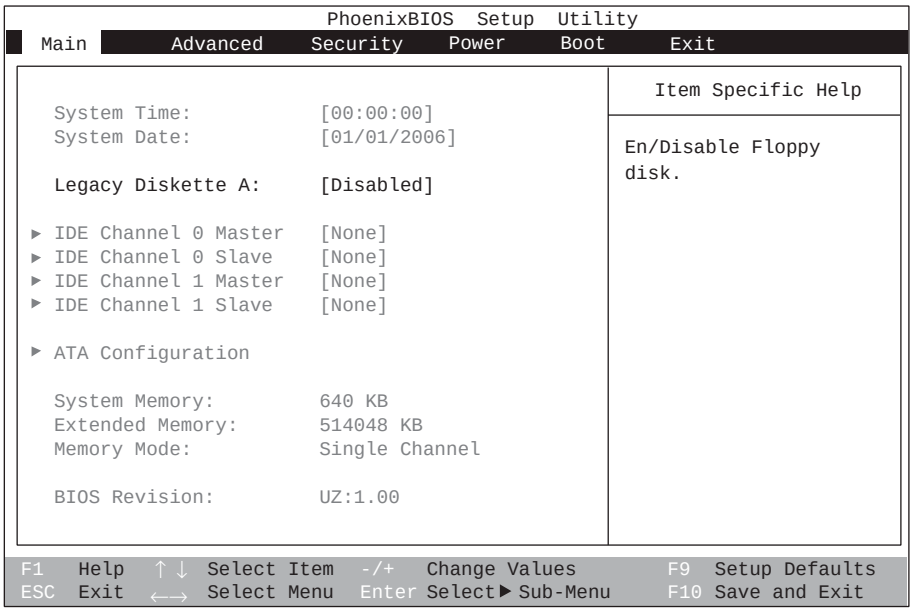

Figure 23 Main Menu (SCH5017)

Legacy Diskette A Used to disable/enable floppy drive A.
Only 3.5" 1.44MB floppy drives may be used. Note that 1.44MB drives typically support 720KB disks as well.

Disabled	No floppy drive
1.44MB 3½"	Enable a 3.5" 1.44MB floppy drive

Advanced Menu

Both “I/O Device Configuration 1” and “Console Redirection” sub-menus are added to the Advanced Menu:

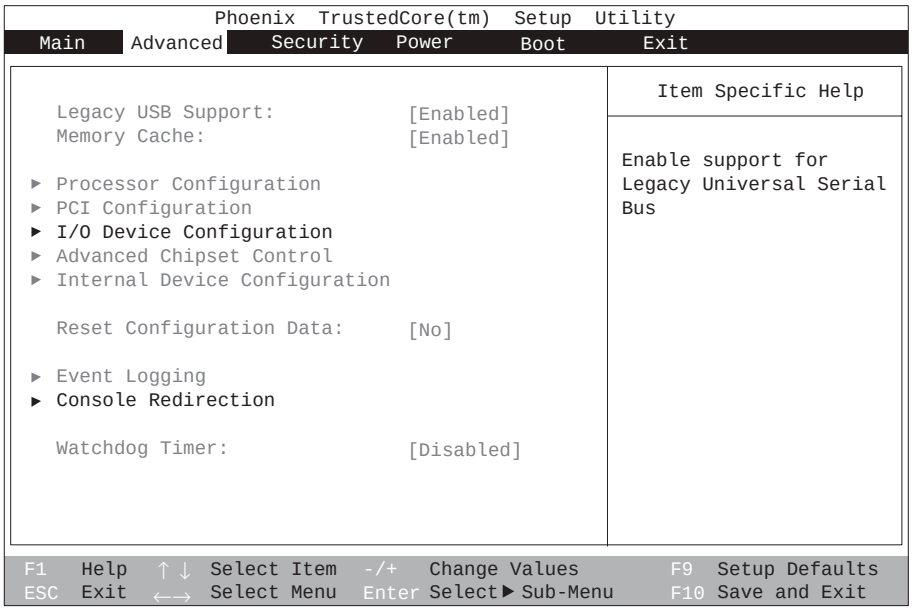
Phoenix TrustedCore(tm) Setup Utility
Main Advanced Security Power Boot Exit
Item Specific Help
Legacy USB Support: [Enabled]
Memory Cache: [Enabled]
Enable support for Legacy Universal Serial Bus
▶ Processor Configuration
▶ PCI Configuration
▶ I/O Device Configuration
▶ Advanced Chipset Control
▶ Internal Device Configuration
Reset Configuration Data: [No]
▶ Event Logging
▶ Console Redirection
Watchdog Timer: [Disabled]
F1 Help ↑ ↓ Select Item -/+ Change Values F9 Setup Defaults
ESC Exit ←→ Select Menu Enter Select ▶ Sub-Menu F10 Save and Exit

Figure 24 Advanced Menu (SCH5017)

I/O Device Configuration 1

Sets the serial ports (A and B) and parallel port.

Console Redirection

Defines the Console Redirection settings.

I/O Device Configuration 1 Settings

The following settings menu is added.

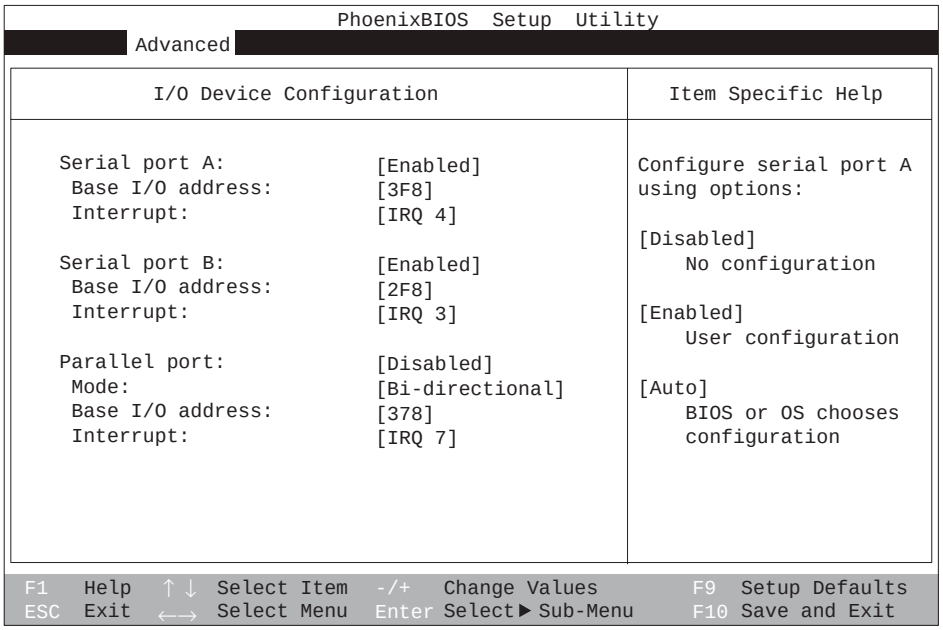

Figure 25 I/O Device Configuration 1 Settings Menu

Serial port A Defines the I/O port address and IRQ (interrupt level) for serial port A and serial port B.

Serial port B

Enabled Internal serial port A (or B) is used. The following options appear when "Enabled" is selected:

Base I/O Address
Any of the following four I/O addresses may be selected:

3F8, **2F8, 3E8, 2E8**

Interrupt Either of the following two interrupt levels may be selected:

IRQ 4, **IRQ 3**

Auto Internal serial port A (or B) is used. When "Auto" is selected, the I/O address and interrupt level settings are made automatically.

Disabled Internal serial port A (or B) not used

Parallel port Defines the operation mode, I/O port address and IRQ (interrupt level) for the parallel port.

Enabled Internal parallel port is used. The following options appear when Enabled is selected:

Mode Selects the operating mode of the internal parallel port.

Bi-directional
Operates in bi-directional mode

ECP Operates in ECP mode

EPP Operates in EPP mode (EPP 1.9)

Output Only
Operates in unidirectional mode

Base I/O Address
Either of the following two I/O addresses may be selected:

278, 378

Interrupt Either of the following two interrupt levels may be selected:

IRQ 5, IRQ 7

DMA Channel
Selects the DMA channel. DMA channel options are activated only when ECP mode has been selected in the Mode section.

DMA 1 DMA channel 1 used

DMA 3 DMA channel 3 used

Auto Internal parallel port is used. When Auto is selected, only the operating Mode is settable, with the I/O address, interrupt level and DMA channel settings being made automatically.

Mode Same options as found in the Enabled mode.

Bi-directional
Operates in bi-directional mode

ECP Operates in ECP mode

EPP Operates in EPP mode (EPP 1.9)

Output Only
Operates in unidirectional mode

Disabled The internal parallel port is not used.

When the serial port and parallel port options are set to [Auto], PCI device resources (I/O port address and IRQ) are preferentially assigned.

As a result, if the resources available to be assigned to the serial port and parallel port are insufficient, some of the ports may become disabled.

Therefore, to give preference to a serial port or the parallel port, set it to [Enabled] instead of [Auto].

Internal Device Configuration Settings

A “Floppy Disk Controller” option is added to the Internal Device Configuration Settings:

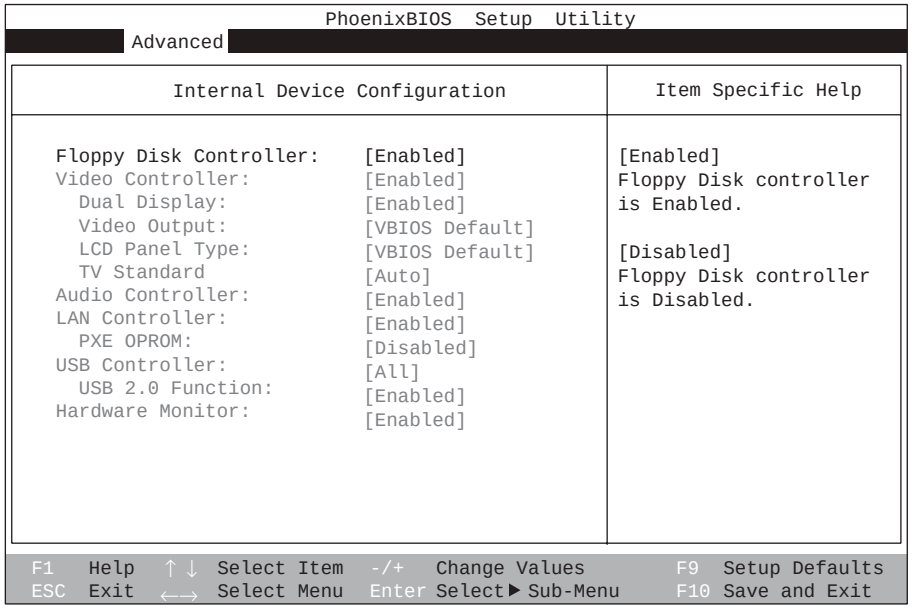
PhoenixBIOS Setup Utility
Advanced
Internal Device Configuration
Item Specific Help
Floppy Disk Controller: [Enabled]
Video Controller: [Enabled]
Dual Display: [Enabled]
Video Output: [VBIOS Default]
LCD Panel Type: [VBIOS Default]
TV Standard [Auto]
Audio Controller: [Enabled]
LAN Controller: [Enabled]
PXE OPROM: [Disabled]
USB Controller: [All]
USB 2.0 Function: [Enabled]
Hardware Monitor: [Enabled]
[Enabled]
Floppy Disk controller is Enabled.
[Disabled]
Floppy Disk controller is Disabled.
F1 Help ↑ ↓ Select Item -/+ Change Values F9 Setup Defaults
ESC Exit ←→ Select Menu Enter Select ▶ Sub-Menu F10 Save and Exit

Figure 26 Internal Device Configuration Settings Menu (SCH5017)

Floppy Disk Controller

Determines whether the onboard floppy disk controller is used or not.

Enabled	Onboard floppy disk controller is used
Disabled	Onboard floppy disk controller is not used

Console Redirection Settings

The following settings menu is added:

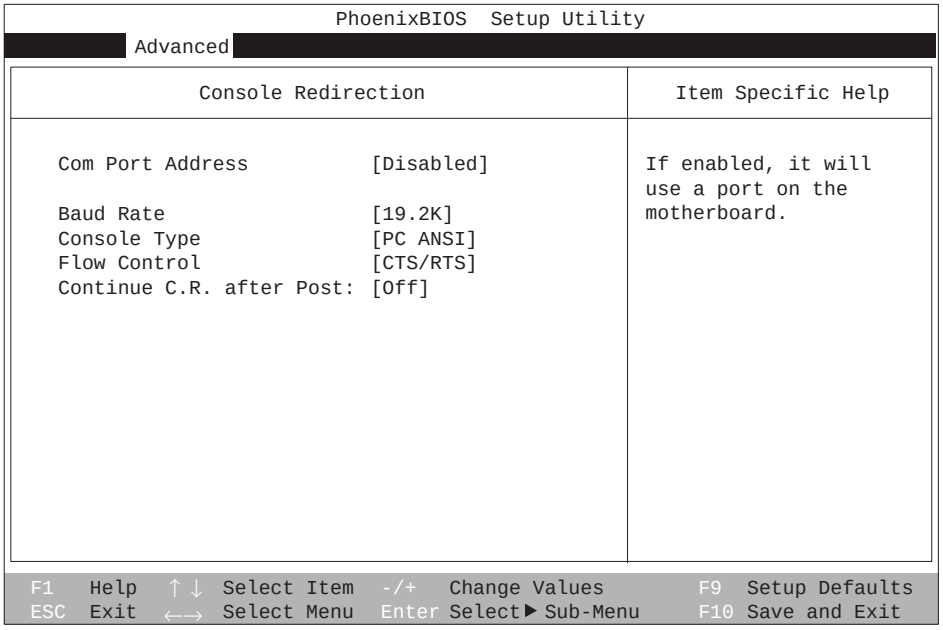
PhoenixBIOS Setup Utility
Advanced
Console Redirection
Item Specific Help
Com Port Address [Disabled]
Baud Rate [19.2K]
Console Type [PC ANSI]
Flow Control [CTS/RTS]
Continue C.R. after Post: [Off]
If enabled, it will use a port on the motherboard.
F1 Help ↑ ↓ Select Item -/+ Change Values F9 Setup Defaults
ESC Exit ←→ Select Menu Enter Select ▶ Sub-Menu F10 Save and Exit

Figure 27 Console Redirection Settings Menu

Com Port Address Determines whether Console Redirection is used or not. Set the com port address when Console Redirection is used:

- **Disabled** Console Redirection is not used.
- **COM Port A** Console Redirection is used via COM Port A.
- **COM Port B** Console Redirection is used via COM Port B.

Caution When Console Redirection is used, it is impossible to display a logo screen, and also the setting of Boot-time Diagnostics Screen option cannot be changed.

Baud Rate Determines the BAUD rate of the port used for console redirection. May be set to between 300bps and 115.2kps.

Console Type Determines the console type for client applications.

- **PC ANSI** PC ANSI is used.
- **VT100** VT100 is used.

Flow Control Determines the flow control on the com port:

- **None** Flow control is not used.
- **XON/XOFF** Flow control is used by software.
- **CTS/RTS** Flow control is used by hardware.

Continue C.R. after Post

Determines whether Console Redirection is used or not after the POST phase:

- **Off** Console Redirection is not used.
- **On** Console Redirection is used.

Refer See *Console Redirection*.

BIOS Setup Changes (Due to SIO10N268)

When a SIO10N268 Super I/O chip (from SMSC) is used, a variety of changes occur in the BIOS Setup menus.

Advanced Menu

A "I/O Device Configuration 2" sub-menu is added to the Advanced Menu:

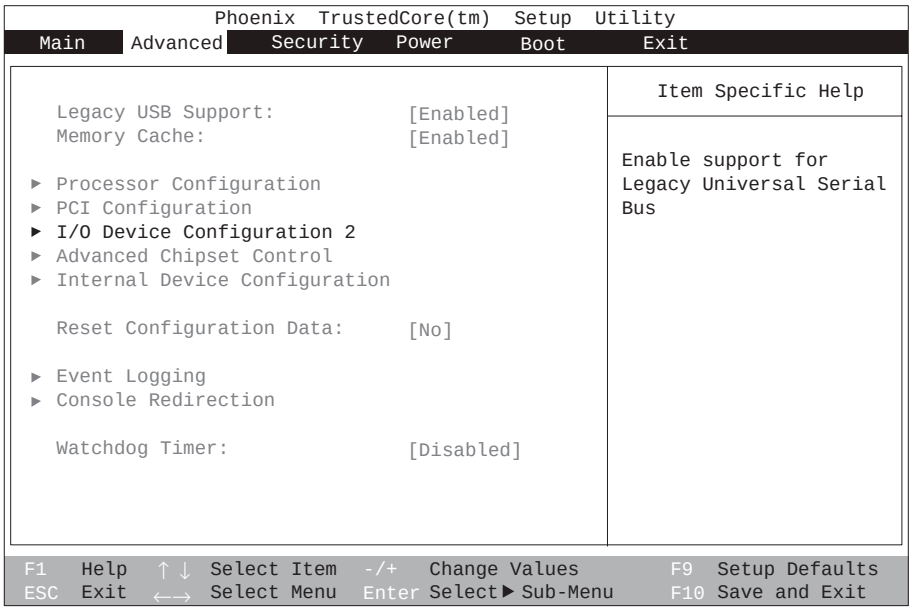
Phoenix TrustedCore(tm) Setup Utility
Main Advanced Security Power Boot Exit
Item Specific Help
Legacy USB Support: [Enabled]
Memory Cache: [Enabled]
Enable support for Legacy Universal Serial Bus
▶ Processor Configuration
▶ PCI Configuration
▶ I/O Device Configuration 2
▶ Advanced Chipset Control
▶ Internal Device Configuration
Reset Configuration Data: [No]
▶ Event Logging
▶ Console Redirection
Watchdog Timer: [Disabled]
F1 Help ↑ ↓ Select Item -/+ Change Values F9 Setup Defaults
ESC Exit ←→ Select Menu Enter Select ▶ Sub-Menu F10 Save and Exit

Figure 28 Advanced Menu (SIO10N268)

I/O Device Configuration 2

Sets the serial ports (C, D, E, and F).

I/O Device Configuration 2 Settings

The following settings menu is added:

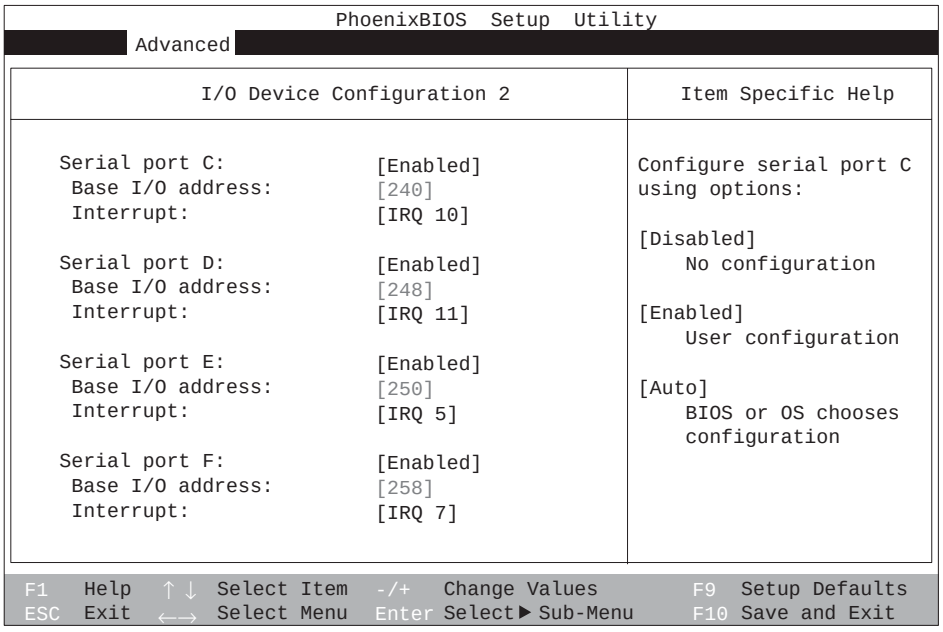

Figure 29 I/O Device Configuration 2 Settings Menu

Serial port C
Serial port D
Serial port E
Serial port F

Defines the I/O port address and IRQ (interrupt level) for serial port C, serial port D, serial port E, and serial port F.

Enabled Internal serial port C (, D, E or F) is used. The following options appear when "Enabled" is selected:

Base I/O Address
Set the following I/O address:

240 (for serial port C)

248 (for serial port D)

250 (for serial port E)

258 (for serial port F)

Interrupt Either of the following eight interrupt levels may be selected:

IRQ 3, **IRQ 4, IRQ 5, IRQ 6, IRQ 7, IRQ 10, IRQ 11, IRQ 12**

Auto Internal serial port C (, D, E or F) is used. When "Auto" is selected, the I/O address and interrupt level settings are made automatically.

Disabled Internal serial port C (, D, E or F) is not used.

Console Redirection

This BIOS version includes the Console Redirection function which makes it possible to access the BIOS SETUP and a command line based OS environment from a VT100 or ANSI terminal via one of the available serial ports on the Plug-N-Run E1 modules.

Caution Console Redirection is only available on systems equipped with a SCH5017 Super I/O chip from SMSC.

Required Terminal Environment

The following is required for Console Redirection access:

- A system equipped with either a VT100 or ANSI terminal, or with a terminal emulator that supports the VT100 or ANSI standard and is capable of displaying at least 26 lines.

Since the use of special keys (such as function keys) may be required in a client application, the following escape sequence codes must be supported. Refer to the documentation for the terminal emulator being used to set escape sequence codes.

Table 9 Special Key and Escape Sequence Codes

Special Key	Escape Sequence
F1	Esc O P
F2	Esc O Q
F3	Esc O R
F4	Esc O S
F3	Esc O w
F4	Esc O x
F5	Esc O t
F6	Esc O u
F7	Esc O qs
F8	Esc O r
F9	Esc [2 0 ~
F10	Esc O p

Special Key	Escape Sequence
Insert	Esc [@
Up arrow	Esc [A
Down arrow	Esc [B
Right arrow	Esc [C
Left arrow	Esc [D
Home	Esc [H
End	Esc [K
Page Down	Esc [U
Page Up	Esc [V
Shift Tab	Esc [Z
Print Screen	Esc [i

Required Serial Cable

The serial cable that connects the Plug-N-Run E1 with a terminal must have a DB-9 serial connector wired as follows:

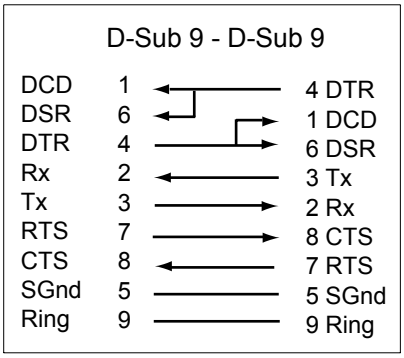

Figure 30 Serial Cable Wiring Diagram

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INDEX

A

ACHI Mode 25
Advanced Chipset Control 25
Advanced Chipset Control Settings 30
Advanced CPU Configuration 37
Advanced Menu 25
  Event Logging Settings 33
  Internal Device Configuration Settings 31
  PCI Configuration Settings 28
  PCI Device, Slot Settings 29
  Sub-Menus 27
After Power Failure 37
ATA
  Mode 54
ATA Configuration 20
ATA Mode 23
ATAPI Removable Device 2
Audio Controller 31

B

Base I/O Address 63, 64, 68
Baud Rate 66
Beep Codes 6
BIOS Features 1
BIOS Functions 45
BIOS Image File 10
BIOS Messages 4
BIOS Modification 2
BIOS Overview 1
BIOS Revision 20
BIOS Setup 1
  Changed Settings 17
  Exiting 18
  Exiting without Saving 18
  Menus 19
  Operating 16
  Saving 17
  Saving and Exiting 18
  Starting 16
  Usable Keys 16
BIOS Setup Menus 19
Boot Device Priority 40
Boot Menu 40
  Boot Device Priority 41
  Sub-Menus 41
Booting
  Any Device 45
Boot-time Diagnostic Screen 40

C

Clear All Event Logs 34
Com Port Address 66
Console Type 66
Core multi-Processing 27

D

Diagnostic Codes 6
Discard Changes 43
DMA Channel 13, 64

E

ECC Error Logging 34
Enable Delay 26
Enable Master 29
Event Log 2
Event Log Capacity 33
Event Log Validity 33
Event Logging 26, 34
Exit Discarding Changes 43
Exit Menu 43
Exit Saving Changes 43
Extended Memory 20

F

Floppy Disk Controller 65
Flow Control 66

H

Hardware Monitor 32

I

IDE 0 41
IDE 1 41
IDE 2 41
IDE 3 41
IDE 4 41
IDE 5 41
Initial On-demand duty 38
Internal Device Configuration 26
Interrupt 63, 64, 68

I/O Device Configuration 1 62
I/O Device Configuration 2 67

L

LAN Controller 31
Latency Timer 29
LBA Mode Control 22
Legacy Diskette A 61
Legacy Floppy Drives 41
Legacy Mode USB Support 2
Legacy USB Support 25
Load Setup Defaults 43

M

Main Menu 20
    ATA Configuration Settings 23
    IDE Channel Detailed Settings 21
    Sub-Menus 21
Memory Cache 25
Memory ECC Error Checking 30
Mode 63
MultiBoot 2
Multi-Sector Transfers 22

O

On-demand duty 38
Option ROM Scan 29
Output Option 26

P

Parallel port 63
Password Security 2
PCI BEV/Legacy Network Card 42
PCI Configuration 25
PCI Device, Slot #n 28
PCI Error Logging 34
PCI SCSI 42
PCI SERR Checking 30
PCI-E Port A 30
PCI-E Port B 30
PCI-E Port C 30
Plug and Play 1
PnP 1
POST 1
POST Error Logging 34
Power Management 1
Power Management Functions 45
Power Menu 36
    Advanced CPU Configuration Settings 38
    Sub-Menus 38
Power On Self Test 1
Primary Master 20
Primary P-ATA Cable 23
Primary Slave 20
Processor Configuration 25
Processor Configuration Settings 27
PXE OPROM 31

Q

QuickBoot 2
QuickBoot Mode 40
QuietBoot 1

R

Reset Configuration Data 26
ROM-BIOS Functions 1

S

SATA
    Features 53
SATA Port 0 20
SATA Port 1 20
Save Changes 43
Secondary Master 20
Secondary Slave 20
Security Menu 35
Serial ATA 2
    Features 53
    Modes 54
Serial ATA Interface 53
Serial port A 63
Serial port B 63
Serial port C 68
Serial port D 68
Serial port E 68
Serial port F 68
Set Supervisor Password 35
SMBIOS 2
SpeedStep (R) Technology 38
Spread Spectrum 32
Start-up Process Flow 3
Super I/O 2
Supervisor Password Is 35
System Date 20
System Interrupts 13
System Memory 20
System Time 20
S-ATA Mode 24

T

Thermal Control Circuit 39
Timeout Delay 26
Transfer Mode 22
Type 21

U

Ultra DMA Mode 22
USB CD-ROM 42
USB Controller 31
USB FDD 41
USB HDD 42
USB KEY 41
USB 2.0 Function 32
Using BIOS Setup 15

V

View Event Log 33

W

Wake up on LAN from S5 36
Wake up on PCI PME from S5 37
Wake up on USB from S3 36
Wake up Time 37
Wake up Time from S5 37
Watchdog Timer 26

Numeric

32 Bit I/O 22

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Plug-N-Run E1 BIOS Manual
PS-E1PR-BM-011
2009.03
PFU Systems, Inc.
Printed In U.S.A.

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